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NATIONAL DAM SAFETY PROGRAM. LAKE PARSIPPANY DAM (NJ-00355), PA--ETC(U)
MAY 79 R J MCDERMOTT, J E GRIBBIN DACW61-79-C-0011

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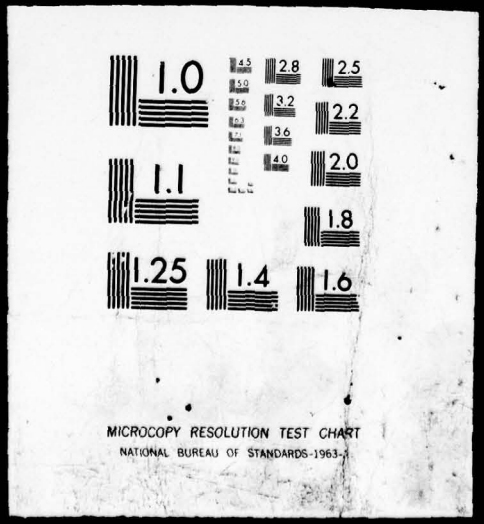

PASSAIC RIVER BASIN
EASTMANS BROOK, MORRIS COUNTY
NEW JERSEY

LEVEL II

LAKE PARSIPPANY DAM
NJ 00355

PHASE 1 INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

(6) Lake Parsippany Dam (NJ-00355)
Passaic River Basin. Eastmans Brook,
Morris County, New Jersey. Phase 1
Inspection Report.

(9) Final rept.,

(10) RIC
Richard J. /McDermott John E. /Gribbin

(15) DACW61-79-C-0011

DEPARTMENT OF THE ARMY

Philadelphia District
Corps of Engineers
Philadelphia, Pennsylvania

(12) 96 p.

(11) May 1979

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Spillways
Riprap
Dams
Embankments
Structural analysis
National Dam Inspection Act Report
Visual Inspection

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report cites results of a technical investigation as to the dam's adequacy. The inspection and evaluation of the dam is as prescribed by the National Dam Inspection Act, Public Law 92-367. The technical investigation includes visual inspection, review of available design and construction records, and preliminary structural and hydraulic and hydrologic calculations, as applicable. An assessment of the dam's general condition is included in the report.

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DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
CUSTOM HOUSE—2 D & CHESTNUT STREETS
PHILADELPHIA, PENNSYLVANIA 19106

IN REPLY REFER TO
NAPEN-D

12 SEP 1979

Honorable Brendan T. Byrne
Governor of New Jersey
Trenton, NJ 08621

Dear Governor Byrne:

Inclosed is the Phase I Inspection Report for Lake Parsippany Dam in Morris County, New Jersey which has been prepared under authorization of the Dam Inspection Act, Public Law 92-367. A brief assessment of the dam's condition is given in the front of the report.

Based on visual inspection, available records, calculations and past operational performance, Lake Parsippany Dam, initially listed as a high hazard potential structure, but reduced to a significant hazard potential structure as a result of this inspection, is judged to be in fair overall condition. Lake Parsippany Dam is one of three embankments that impound Lake Parsippany. In addition to the dam, Lake Parsippany Dyke No. 1 and Dyke No. 2 impound the lake. The dam's spillway is considered inadequate since 83% of the Spillway Design Flood -SDF- would overtop the dam. (The SDF, in this instance, is equal to one-half the probable maximum flood.) To insure the adequacy of the structure, the following actions, as a minimum, are recommended:

a. The spillway's adequacy should be determined by a qualified professional consultant engaged by the owner using more sophisticated methods, procedures, and studies within six months from the date of approval of this report. Any remedial measures necessary to insure the adequacy of the spillway and to prevent overtopping should be initiated within calendar year 1980.

b. The following remedial actions should be completed within six months from the date of approval of this report:

(1) Trees, brush and weeds should be removed from the embankment and an adequate ground cover established.

(2) Riprap on the upstream face of the dam should be thoroughly renovated to form a uniform surface and provide adequate slope protection.

(3) The dam crest should be protected from pedestrian traffic by an appropriate surfacing.

(4) The deteriorated concrete spillway, wingwalls and apron surface should be thoroughly inspected and repaired.

(5) Repair the railing and steps of the walkway over the spillway where necessary.

(6) Trees and debris in the downstream channel and the outlet works discharge channel should be removed.

(7) Measures should be taken to allow the low area at the downstream toe of the dam at the bend point to drain property.

c. The owner of the dam should initiate a program of periodic inspection and maintenance, the complete records of which should be kept on file. A visual inspection should be made annually and reported on a standardized check-list form. Repairs should be made as required and necessary maintenance should be performed annually.

A copy of the report is being furnished to Mr. Dirk C. Hofman, New Jersey Department of Environmental Protection, the designated State Office contact for this program. Within five days of the date of this letter, a copy will also be sent to Congresswoman Millicent Fenwick of the Fifth District. Under the provision of the Freedom of Information Act, the inspection report will be subject to release by this office, upon request, five days after the date of this letter.

Additional copies of this report may be obtained from the National Technical Information Services (NTIS), Springfield, Virginia 22161 at a reasonable cost. Please allow four to six weeks from the date of this letter for NTIS to have copies of the report available.

NAPEN-D
Honorable Brendan T. Byrne

An important aspect of the Dam Safety Program will be the implementation of the recommendations made as a result of the inspection. We accordingly request that we be advised of proposed actions taken by the State to implement our recommendations.

Sincerely,

JAMES G. TON
Colonel, Corps of Engineers
District Engineer

1 Incl
As stated

Copies furnished:
Dirk C. Hofman, P.E., Deputy Director
Division of Water Resources
N.J. Dept. of Environmental Protection
P.O. Box CN029
Trenton, NJ 08625

John O'Dowd, Acting Chief
Bureau of Flood Plain Management
Division of Water Resources
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LAKE PARSIPPANY DAM (NJ00355)

CORPS OF ENGINEERS ASSESSMENT OF GENERAL CONDITIONS

This dam was inspected on 23 April 1979 by Storch Engineers under contract to the State of New Jersey. The State, under agreement with the U.S. Army Engineer District, Philadelphia, had this inspection performed in accordance with the National Dam Inspection Act, Public law 92-367.

Lake Parsippany Dam, initially listed as a high hazard potential structure, but reduced to a significant hazard potential structure as a result of this inspection, is judged to be in fair overall condition. Lake Parsippany Dam is one of three embankments that impound Lake Parsippany. In addition to the dam, Lake Parsippany Dyke No. 1 and Dyke No. 2 impound the lake. The dam's spillway is considered inadequate since 83% of the Spillway Design Flood -SDF- would overtop the dam. (The SDF, in this instance, is equal to one-half the probable maximum flood.) To insure the adequacy of the structure, the following actions, as a minimum, are recommended:

a. The spillway's adequacy should be determined by a qualified professional consultant engaged by the owner using more sophisticated methods, procedures, and studies within six months from the date of approval of this report. Any remedial measures necessary to insure the adequacy of the spillway and to prevent overtopping should be initiated within calendar year 1980.

b. The following remedial actions should be completed within six months from the date of approval of this report:

(1) Trees, brush and weeds should be removed from the embankment and an adequate ground cover established.

(2) Riprap on the upstream face of the dam should be thoroughly renovated to form a uniform surface and provide adequate slope protection.

(3) The dam crest should be protected from pedestrian traffic by an appropriate surfacing.

(4) The deteriorated concrete spillway, wingwalls and apron surface should be thoroughly inspected and repaired.

(5) Repair the railing and steps of the walkway over the spillway where necessary.

(6) Trees and debris in the downstream channel and the outlet works discharge channel should be removed.

(7) Measures should be taken to allow the low area at the downstream toe of the dam at the bend point to drain property.

c. The owner of the dam should initiate a program of periodic inspection and maintenance, the complete records of which should be kept on file. A visual inspection should be made annually and reported on a standardized check-list form. Repairs should be made as required and necessary maintenance should be performed annually.

APPROVED: Jack Tolles for
JAMES G. TON
Colonel, Corps of Engineers
District Engineer

DATE: 11 Oct 79

PHASE I REPORT
NATIONAL DAM SAFETY PROGRAM

Name of Dam:	Lake Parsippany Dam, N.J.00355
State Located:	New Jersey
County Located:	Morris
Drainage Basin:	Passaic River
Stream:	Eastmans Brook
Date of Inspection:	April 23, 1979

Assessment of General Condition of Dam

Based on visual inspection, past records and Phase I engineering analyses, Lake Parsippany Dam is assessed as being in fair overall condition.

Based on investigations of the downstream flood plain made in connection with this report, it is recommended that the hazard potential classification be downgraded from high to significant hazard.

Hydraulic and hydrologic analyses indicate that the spillway is inadequate. The spillway is not capable of passing the designated Spillway Design Flood (SDF) without an overtopping of the dam. (The SDF for Lake Parsippany Dam is equal to one-half the probable maximum flood.) The spillway is capable of passing approximately 41 percent of the probable maximum flood or 82 percent of the SDF.

Therefore, the owner should engage a qualified professional engineer in the near future to perform accurate hydraulic and hydrologic analyses relating to spillway capacity. Based on the findings of the analyses, remedial measures should be undertaken to correct the inadequate condition of the spillway. One possible remeial measure to be considered is a regrading of the entire dam to form a level crest with elevation equal to 297.0 which is the original design elevation of the dam crest.

Trees and brush on the embankment should be removed in the near future.

Riprap on the upstream face of dam should be thoroughly renovated in the near future to form a uniform surface and provide adequate slope protection.

The spillway, wingwalls and apron surface are in deteriorated condition. In the near future they should be thoroughly inspected and renovated by sand blasting, patching, grouting and coating with epoxy.

The railing and the steps of the walkway are in hazardous condition and should be repaired in the near future.

Trees and debris in the downstream channel should be removed in the near future.

Measures should be taken in the near future to allow the low area at the downstream toe of dam at the bend point to drain properly.

The owner should, in the near future, implement a program of periodic inspection and maintenance for the dam. Repairs should be made as required and the following maintenance should be performed annually: remove adverse vegetation from the embankment and fill and sod any eroded surfaces and clear the downstream channel. The current practice of lowering the lake for maintenance purposes should be continued and at least once every five years the lake should be lowered completely at which time the lake should be cleaned and submerged portions of the dam and spillway inspected and repaired.

Lake Parsippany Dam is one of three embankments that impound Lake Parsippany. In addition to the dam, Lake Parsippany Dyke No. 1 and Dyke No. 2 impound the lake. Remedial measures to correct the inadequate condition of the spillway of Lake Parsippany Dam should be performed in conjunction with

remedial measures for the two dykes as specified in the "Phase I Inspection Report, National Dam Safety Program for Lake Parsippany Dyke No. 1, Morris County, New Jersey, Fed. Inventory Number NJ00356," dated June 1979.

Richard J. McDermott, P.E.

John E. Gribbin, P.E.

OVERVIEW - LAKE PARSIPPANY DAM

23 APRIL 1979

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PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 30214. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. It is important to note that the condition of dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that the unsafe conditions be detected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. The test flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

LAKE PARSIPPANY DAM, I.D. NJ00355

SECTION 1: PROJECT INFORMATION

1.1 General

a. Authority

Public Law 92-367, August 8, 1972 authorized the Secretary of the Army, through the Corps of Engineers, to initiate a National Program of Dam Inspection throughout the United States. The Division of Water Resources of the New Jersey Department of Environmental Protection (NJDEP) in cooperation with the Philadelphia District of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within the State of New Jersey. Storch Engineers has been retained by the NJDEP to inspect and report on a selected group of these dams. The NJDEP is under agreement with the Philadelphia District of the Corps of Engineers.

b. Purpose of Inspection

The visual inspection of Lake Parsippany Dam was made on April 23, 1979. The purpose of the inspection was to make a general assessment of the structural integrity and operational adequacy of the dam structure and its appurtenances.

1.2 Description of Project

a. Description of Dam and Appurtenances

Lake Parsippany Dam is an earthfill dam with a free overflow concrete weir spillway. Two rectangular notches are located in the weir. Dry weather outflow can be controlled by two steel flashboards acting as stoplogs when placed in each notch (one in place during inspection).

The earthfill embankment is 13 feet high at the outlet works and about 800 feet long with its crest at elevation 296.0 (N.G.V.D.). The embankment crest varies from 8 feet to 13 feet wide. Both the upstream and downstream slopes are about 2.5 horizontal to 1 vertical. The embankment is covered with sparse grass and trees and brush growth. The upstream slope is covered with riprap with a concrete cap.

A concrete corewall is located within the embankment for its entire length. The top of the embankment is seriously eroded. At some locations the corewall is exposed as much as 0.3 feet.

Discharge from the spillway flows into a channel 40 feet wide with bank slopes of 1:4 on both sides. It then flows through two 42-inch reinforced concrete pipes under a local road (Halsey Road) and continues for about 600 feet before crossing under Interstate Route 287.

The outlet works consists of a 24-inch cast iron pipe controlled by a lift gate located in a reinforced concrete manhole.

A timber pedestrian walkway spans the full length of the spillway. It is supported by the two concrete wingwalls and a concrete center pier. The bottom of walkway is approximately 3 to 3.5 feet above the spillway crest.

Lake Parsippany Dam is one of three embankments that impound Lake Parsippany. In addition to the dam, Lake Parsippany Dyke No. 1 located to its west and Dyke No. 2 located to its east impound the lake. Each of the three embankments has crest elevation equal to 296.0.

b. Location

Lake Parsippany Dam is located in the Township of Parsippany-Troy Hills, Morris County, New Jersey. The east/west oriented dam impounds Lake Parsippany which is the recreational center of a residential community. The spillway discharges into Eastmans Brook.

c. Size and Hazard Classification

Size and Hazard Classification criteria presented in "Recommended Guidelines for Safety Inspection of Dams", published by the U.S. Army Corps of Engineers are as follows:

SIZE CLASSIFICATION

	Impoundment	
Category	Storage (Ac-ft)	Height (Ft)
Small	< 1000 and ≥ 50	< 40 and ≥ 25
Intermediate	≥ 1000 and < 50,000	≥ 40 and < 100
Large	≥ 50,000	≥ 100

HAZARD POTENTIAL CLASSIFICATION

Category	Loss of Life (Extent of Development)	Economic Loss (Extent of Development)
Low	None expected (no permanent structures for human habitation)	Minimal (Undeveloped to occasional structures or agriculture)
Significant	Few (No urban developments and no more than a small number of inhabitable structures)	Appreciable (Notable agriculture, industry or structures)
High	More than few	Excessive (Extensive community, industry or agriculture)

The following data relating to size and downstream hazard for Parsippany Lake Dam have been obtained for this Phase I assessment:

Storage: 862 acre-feet

Height: 13 feet

Potential Loss of Life:

a. Real estate office immediately downstream of dam would be inundated by approximately 4 feet by outflow due to overtopping failure of dam.

b. Four homes within 270 feet of dam would be inundated by 1 to 2 feet above ground elevation by outflow due to dam failure.

Potential Economic Loss:

a. Real estate office could sustain structural damage by outflow due to dam failure.

b. Four homes could sustain water damage by outflow due to dam failure; no structural damage anticipated.

c. No damage to Halsey Road or Route 287 anticipated as a result of dam failure outflow.

Therefore, Lake Parsippany Dam is classified as "Small" size and "Significant" hazard potential.

d. Ownership

Lake Parsippany Dam is owned and operated by Lake Parsippany Property Association, P. O. Box 62, Parsippany, N.J. 07054.

e. Purpose of Dam

The purpose of the dam is the impoundment of a recreational lake facility for a residential development.

f. Design and Construction History

Lake Parsippany Dam was constructed in 1933 as part of a real estate development. The dam was constructed in conjunction with two dykes at Lake Parsippany by W. Wickstrom, who was both the engineer and builder. All work on the dam and dykes was completed by the end of July 1933. In September 1933 it was reported that part of the dam had settled. Also, fill had been eroded behind the wingwall of the spillway. Repair work was completed by the end of October 1933.

g. Normal Operational Procedures

The dam and appurtenance are maintained by the Lake Parsippany Property Owners Association. There is no fixed schedule of maintenance; repairs are made as the need arises.

The outlet works is used to drain the lake for lake maintenance purposes. The lake is reportedly outletted in the fall of every year.

1.3 Pertinent Data

a. Drainage Area	1.12 square miles
b. Discharge at Damsite	
Maximum known flood at damsite	May 1968 hurricane - inflow magnitude unknown.
Outlet works at normal pool elevation	48 c.f.s.
Spillway capacity at top of dam	514 c.f.s.
c. Elevation (Feet above MSL)	
Top of Dam	296.0
Maximum pool-design surcharge	296.1
Full flood control pool	N.A.
Recreation pool	293.7

Spillway crest	293.4
Stream bed at centerline of dam	285.0
Maximum tailwater	294 (Estimated)

d. Reservoir

Length of maximum pool	3,000 feet
Length of recreation pool	2,800 feet (scaled)
Length of flood control pool	N. A.

e. Storage (Acre-feet)

Recreation pool	459 acre-feet
Flood control pool	N.A.
Design Surcharge	887 acre-feet
Top of dam	862 acre-feet

f. Reservoir Surface (Acres)

Top of dam	219 acres (Estimated)
Maximum pool	230 acres (Estimated)
Flood control pool	N.A.
Recreation pool	151 acres
Spillway crest	151 acres

g. Dam

Type	Earthfill
Length	800 feet
Hydraulic height	13 feet (at outlet works)
Side slopes - Upstream	2.5 horiz. to 1 vert.
- Downstream	2.5 horiz. to 1 vert.
Zoning	Clay fill
Impervious core	Concrete corewall
Cutoff	N.A.
Grout curtain	N.A.

h. Diversion and Regulating Tunnel — N.A.

i. Spillway

Type	Controlled concrete weir
Length of weir - primary	4.9 feet
- secondary	1.9 feet
- tertiary	41.7 feet
Crest elevation - primary	294.0
- secondary	293.7
- tertiary	294.0
Gates	N.A.
Upstream channel	N.A.
Downstream channel	40' wide natural channel

J. Regulating outlets

24" dia. Sluice gate in manhole.

SECTION 2: ENGINEERING DATA

2.1 Design

The following plans are available: "Plan of Proposed Dam and Dykes; Halseytown, Parsippany-Troy Hills Township" by W. Wickstrom, dated January 6, 1933. The plans include the following:

1. Plan of dam
2. Location map
3. Drainage basin map
4. Typical sections
5. Elevation

Calculations showing drainage area and peak runoff are available in the NJDEP file. A soil description of the foundation at the dam site by Wickstrom is: "loam and decayed vegetation on 6 feet of yellow clay." Foundation clay is described to be "in good condition with no sand pockets."

A soil investigation of the dam site by Joseph S. Ward Inc. in 1975 indicated that the soil upon which the dam is founded consists of approximately 5 feet to 10 feet of silt and clay overlying till.

A topographic survey of the dam prepared by Bowe, Walsh and Associates in 1974 is reported to be available.

2.2 Construction

Two inspection reports during construction reported that foundation clay was "in good condition." Two additional site inspections indicated construction was progressing satisfactorily. It was reported that construction was totally completed on July 31, 1933.

Inspection report dated September 19, 1933 indicated settlement of the embankment and loss of fill at junction of embankment and wingwall of spillway. This situation was reported to have been corrected by the end of October 1933. In September of 1935, it was reported that embankment again settled 0.5 feet. In the same inspection report, disintegration of the concrete spillway and wingwall was also noted. However, no record of repair work as a result of this inspection is available in the NJDEP file.

An inspection report prepared by Wilbur F. Downing, Jr. in October 1968 recommended minor maintenance to correct spalling. This repair work was reportedly done in 1969 according to the owner.

2.3 Operation

Records in the NJDEP file indicate that from 1968 to 1972 the lake was drawn down every year for the purpose of dock repair and cleaning. Maintenance personnel indicated that it is current practice to lower the lake for same purpose in the fall of every year.

2.4 Evaluation

a. Availability

Available engineering information is limited to that which is on file at the NJDEP, the Lake Parsippany Property Association and the Township of Parsippany-Troy Hills. The NJDEP file contains copies of plans, correspondence and inspection reports. The file is available for inspection at the offices of the Bureau of Flood Plain Management, 1474 Prospect Street, Trenton, N.J. The Lake Parsippany Property Association file contains a report on structural analysis. The Township of

Parsippany-Troy Hills file contains reports on structural analysis and soil investigation as well as a topographic survey.

b. Adequacy

The available information forms a fairly complete description of the subject dam and is considered to be of significant assistance in the performance of a Phase I evaluation. A list of absent information is included in paragraph 7.1.b.

c. Validity

Most information that could be verified is valid within a reasonable allowance for error. Absent data and data found in the NJDEP file which is at variance with the findings of this investigation are noted in paragraph 7.1.b.

SECTION 3: VISUAL INSPECTION

3.1 Findings

a. General

The inspection of Lake Parsippany Dam was performed on April 23, 1979 by staff members of Storch Engineers. A copy of the visual inspection check list is contained in Appendix I. The following procedures were employed for the inspection:

1. The embankment of the dam, appurtenant structures and adjacent areas were examined.
2. The embankment and accessible appurtenant structures were measured and key elevations determined by surveyors level.
3. Key elevations of downstream channel, typical section and elevations of adjacent areas were determined by a level.
4. The embankment, appurtenant structures and adjacent areas were photographed

b. Dam

The dam embankment appears to be uniformly aligned horizontally with a bend point near the center as shown on the construction drawings. The vertical alignment is irregular with significant depressions noted throughout, most noticeably near the east (spillway) end. The concrete corewall is exposed for about half the length of the dam due to pedestrian traffic and erosion and possibly settlement. The exposed part of the wall does not show any sign of disintegration or spalling. The crest of embankment is bare for most of its length due to pedestrian traffic.

Most of the upstream face of dam is covered with riprap. The condition of the riprap appears to be satisfactory below the water line and fair to poor above the water line. In an attempt to protect the riprap, a concrete capping was placed on the upstream slope down to normal pool level. (There is no known record of this repair.) This non-uniform concrete capping is cracked extensively and is generally in a deteriorated condition.

Trees and brush are allowed to grow freely on both faces of the embankment. Some of the trees are very large (caliper greater than 24 inches). Grass on the downstream face is generally sparse and eroded to form pedestrian paths except where the downstream face forms the rear of homesites. No evidence of settling or seepage was observed. No animal holes were observed.

The generalized soils description of the dam site consists of alluvial soil composed of a wide range of grain sizes sorted into rough, intermingled layers by successive stages of water action. The alluvial soil overlies assorted, relatively homogeneous material, predominantly silt and clay laid down in the bed of the extinct Glacial Lake Passaic during the Wisconsin glaciation.

Previous on-site soil investigations indicate that soil in the vicinity of the dam is composed of a layer of silt and clay overlying till.

c. Appurtenant Structures

The spillway and the wingwalls are in fair condition. Two longitudinal cracks were observed near the crest and transverse cracks on both the upstream and downstream faces.

The apron appears to be in structurally sound condition with little or no settlement observed. However, significant spalling was observed on its surface. The timber walkway over the spillway is structurally sound; however, one railing is loose and is considered hazardous. The step-down from the west end of the walkway to the embankment surface is greater than 1 foot and is considered hazardous.

The east wingwall of the spillway is severely spalled over its entire surface and there is evidence of previous patching which now has become deteriorated. The west wingwall is spalled on its downstream end and cracked near the center. The upstream portion of the wingwall is broken off completely and reinforcing rods are protruding. The center pier is spalled on its upstream side from the waterline upward for approximately 1.5 feet. The downstream side of the pier has been patched extensively.

The outlet works manhole and the gate operating stem appear to be in good condition. The 24" cast iron pipe could not be observed except at the outlet which was almost totally submerged by tailwater that had very little movement. The grouted stone endwall is in deteriorated condition and the outlet channel is silted and contains accumulated debris.

d. Reservoir Area

Lake Parsippany is approximately triangular in shape with maximum width approximately 2800 feet. It is surrounded by a densely populated residential area. The overall topography of the watershed area is rolling. Many homesites surrounding the lake have docks and other lake related structures.

e. Downstream Channel

The spillway discharges into a well defined natural stream littered with rocks and debris and overgrown with trees. The channel discharges into two 42" culverts under Halsey Road approximately 200 feet downstream. Three houses are located in this area and they are four to six feet above the stream bed.

Two 21-inch reinforced concrete pipes convey water from the outlet works discharge channel to the main downstream channel just upstream of Halsey Road culverts. Downstream from Halsey Road the stream passes through commercial and residential areas and eventually into Troy Brook.

SECTION 4: OPERATIONAL PROCEDURES

4.1 Procedures

The level of water in Lake Parsippany is regulated naturally by discharge over the concrete weir. The lake is reportedly lowered every year in the fall for cleaning of debris and repairing of docks. The time required to lower the lake 3 feet is reported to be 3 months. This is the rate with the gate opened halfway to avoid flooding downstream properties. The gate reportedly is not opened at times of severe storms to augument the capacity of the spillway.

4.2 Maintenance of the Dam

There is no program of regular inspection and maintenance of the dam and appurtenant structures. Maintenance is performed on an "as needed" basis. Information in the NJDEP file indicates that concrete patch work was done on the spillway pier and wingwall in 1969. The pedestrian walkway was reportedly replaced in 1952.

4.3 Maintenance of Operating Facilities

Maintenance of operating facilities such as outlet works is performed on an "as needed" basis. A new sluice gate was installed about three years ago.

4.4 Description of Warning System

Reportedly, there is no warning system in use at the present time.

4.5 Evaluation of Operational Adequacy

The operation of the dam has been successful to the extent that reportedly it has never been overtopped since it was constructed in 1933.

Maintenance documentation is poor and the maintenance program for the dam appears to be insufficient in the following areas:

1. Trees and brush on embankment.
2. Erosion and possible settlement of embankment resulting in exposure of core wall.
3. Erosion at junction of embankment and spillway wingwalls.
4. Spalling of spillway pier, wingwalls and apron.
5. Accumulation of debris and rocks in outlet works discharge channel and spillway downstream channel.
6. Poor condition of concrete capping on riprap on upstream face of embankment.
7. Riprap fallen out of place on upstream face of embankment.
8. Flashboard support broken off.

SECTION 5: HYDRAULIC/HYDROLOGIC

5.1 Evaluation of Features

a. Design Data

Size and hazard classification were used in conjunction with "Recommended Guidelines for Safety Inspection of Dams" published by the U.S. Army Corps of Engineers to establish the SDF (Spillway Design Flood) for Lake Parsippany Dam. The appropriate SDF range for this facility is 100-year to 1/2 PMF (Probable Maximum Flood). Since the characteristics for Lake Parsippany Dam as described in paragraph 1.2.c, fall in the higher end of their prescribed ranges, 1/2 PMF is used as the SDF.

The inflow hydrograph for Lake Parsippany Dam was calculated using the Soil Conservation Service Triangular Unit Hydrograph with the curvilinear transformation and the HEC-1-DB computer program. General hydrologic characteristics used in this method were computed using USGS quadrangles and aerial photographs. The drainage area contributing to Lake Parsippany is 1.12 square miles. Most of the watershed is completely developed. The SDF peak was computed to be 3025 c.f.s.

Reservoir storage capacities were estimated using surface areas measured from USGS quadrangles. Discharge rates for the spillway were computed by the use of a weir formula appropriate for the configuration of its overflow section. (See Appendix 4). Spillway discharge with lake level equal to the top of dam was computed to be 514 c.f.s.

When the lake level reaches elevation 296.0, outflow from the lake will occur over the dam as well as over Dyke No. 1, Dyke

No. 2 and adjacent level areas of the lake shore. The combined length of overflow used in the HEC-1-DB program for routing the SDF through the spillway at Lake Parsippany Dam was 2535 feet. The routing indicated that the dam would be overtopped by the SDF. Computations show that overtopping in a non-breach condition would occur for about 2.3 hours with a maximum flow height above the dam crest of approximately 0.1 foot and a maximum overall discharge of 830 c.f.s. This overall discharge includes flow over the three embankments and lake shore mentioned above.

b. Experience Data

Reportedly, Lake Parsippany Dam has not been overtopped since it was constructed in 1933. Reportedly, in May 1968 a hurricane resulted in lake stage within approximately 8 inches of the dam crest. At that time, tailwater reached the foundations of some downstream homes but caused no damage.

c. Visual Observation

At the time of the field inspection there was no evidence of recent overtopping the dam.

d. Overtopping Potential

As indicated above, a storm of magnitude equal to the SDF would cause overtopping of the dam to a height of about 0.1 foot in a non-breach condition. The spillway is capable of passing approximately 41 percent of the PMF with lake level equal to the crest of dam.

SECTION 6: STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability

a. Visual Observations

At the time of inspection, considerable deterioration was observed on the concrete surface of the spillway. The uneven vertical alignment of the crest of dam appears to be a result of pedestrian traffic, erosion and possibly settlement. Overall condition of the corewall cannot be precisely determined at the present time; however, the exposed top appears to be in good condition. In general, the dam appears to be structurally stable.

b. Design and Construction Data

A structural analysis by Alpern and Soiter in 1975 indicates that the dam is basically stable for water levels up to 2 feet below top of dam and that basic stability would theoretically exist when water surface is at the top of dam.

c. Operating Records

Records of drawdown permits issued from 1966 to 1972 can be found in NJDEP file.

d. Post Construction Changes

Since Lake Parsippany Dam was constructed, the following changes have taken place:

1. Additional fill placed approximately 425 feet west of the spillway on the downstream slope and at junction of spillway wingwall and embankment.

2. New timber walkway installed in 1952.

3. New sluice gate installed in 1976.

e. Seismic Stability

Lake Parsippany Dam is located in seismic Zone 1 as defined in "Recommended Guidelines for Safety Inspection of Dams" which is a zone of very low seismic activity. Experience indicates that dams in Seismic Zone 1 will have adequate stability under seismic loading conditions if stable under static loading conditions. Lake Parsippany Dam is considered stable under static loading conditions.

SECTION 7: ASSESSMENT AND RECOMMENDATIONS

7.1 Dam Assessment

a. Safety

Based on hydraulic and hydrologic analyses outlined in Section 5 and Appendix 4, the spillway of Lake Parsippany Dam is assessed as being inadequate. The spillway is not able to pass the SDF designed for the dam without an overtopping of the dam.

The structural integrity of the dam appears to be adequate based on field inspection. The Alpern and Soiter report on structural stability supports this assessment.

b. Adequacy of Information

Information sources for this study include: 1) field inspection, 2) plans, reports and correspondence in NJDEP file, 3) USGS quadrangle, 4) aerial photography from Morris County, 5) structural report in Lake Parsippany Property Association file, 6) soil report by Joseph S. Ward Inc. and 7) consultation with the Lake Superintendent of Lake Parsippany Property Owners Association.

The information obtained is sufficient to allow a Phase I assessment as outlined in "Recommended Guidelines the Safety Inspection of Dams."

Some of the absent data are as follows:

1. Stream and lake elevation gauging records.

2. Maintenance documentation.

One datum contained in the NJDEP file at variance with the findings of this report is as follows: overall length of dam, reported to be 925 feet, was measured to be 800 feet.

c. Necessity for Additional Data/Evaluation

Although some data pertaining to Lake Parsippany are not available, additional data are not considered imperative for this Phase I evaluation.

7.2 Recommendations

a. Remedial Measures

Based on hydraulic and hydrologic analyses outlined in paragraph 5.1.a and Appendix 4, the spillway is considered to be inadequate. Therefore, it is recommended that a qualified professional engineer be engaged in the near future to perform more accurate hydraulic and hydrologic analyses relating to the spillway capacity. The analyses should more accurately determine runoff characteristics of the drainage basin and the downstream channel capacity.

Based on the findings of these analyses, the dam and the spillway should be modified to prevent overtopping of the dam resulting from a storm equivalent to the SDF. One possible remedial measure to be considered is a regrading of the entire

dam to form a level crest with elevation equal to 297.0 which is the design elevation of the dam crest. The regrading should be based on a detailed design by a qualified professional engineer.

In addition to the above, it is recommended that the owner, in the near future, undertake the following remedial measures.

1. Trees, brush and weeds should be removed from the embankment and an adequate ground cover established.

2. Riprap on the upstream face of dam should be thoroughly renovated to form a uniform surface and provide adequate slope protection.

3. The dam crest should be protected from pedestrian traffic by and appropriate surfacing.

4. The concrete spillway should be thoroughly inspected and repaired as outlined below:

    a. Drain the lake to an elevation equal to the bottom of the weir.
    b. Sand blast all concrete, pressure grout all major cracks and patch any observed spalls and eroded surfaces.
    c. Apply an epoxy preservative coating to all surfaces.

5. Trees and debris in the downstream channel and the outlet works discharge channel should be removed.

6. Measures should be taken to allow the low area at the downstream toe of dam at the bend point to drain properly.

The implementation of each of the above remedial measures will require proper detailed studies and design as well as the obtaining of applicable NJDEP approvals.

Lake Parsippany Dam is one of three embankments that impound Lake Parsippany. In addition to the dam, Lake Parsippany Dyke No. 1 and Dyke No. 2 impound the lake. Remedial measures to correct the inadequate condition of the spillway of Lake Parsippany Dam should be performed in conjunction with remedial measures for the two dykes as specified in the "Phase I Inspection Report, National Dam Safety Program for Lake Parsippany Dyke No. 1, Morris County, New Jersey, Fed. Inventory Number NJ00356," dated July 1979.

b. Maintenance

In the near future, the owner of the dam should initiate a program of periodic inspection and maintenance, the complete records of which to be kept on file and made available to the public. A visual inspection by a qualified professional engineer should be made annually and reported on a standardized check-list form. Repairs should be made as required and the following maintenance should be performed annually: remove trees and brush from the embankment, repair the riprap, fill and sod any eroded surfaces and clear the downstream channel. The current practice of periodically lowering the lake for maintenance purposes should be continued and at least once very five years the lake should be lowered completely at which time the lake should be cleaned and submerged portions of the dam and spillway should be inspected and repaired.

PLATES

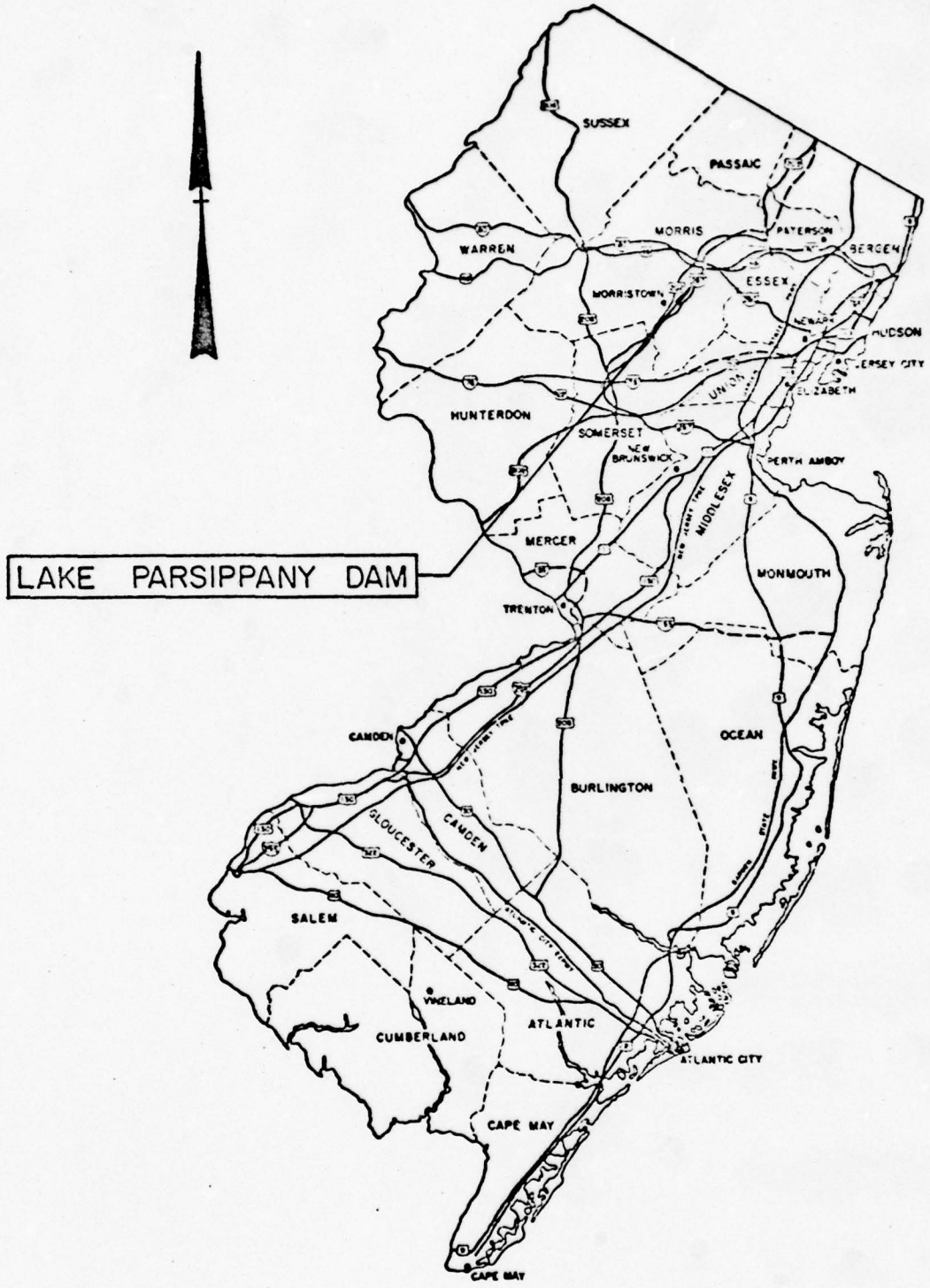


PLATE 1

STORCH ENGINEERS FLORHAM PARK, NEW JERSEY	INSPECTION AND EVALUATION OF DAMS KEY MAP LAKE PARSIPPANY DAM
DIVISION OF WATER RESOURCES N.J. DEPT. OF ENVIR. PROTECTION TRENTON, NEW JERSEY	I.D. N.J. 00355 — SCALE: NONE DATE: APRIL, 1979

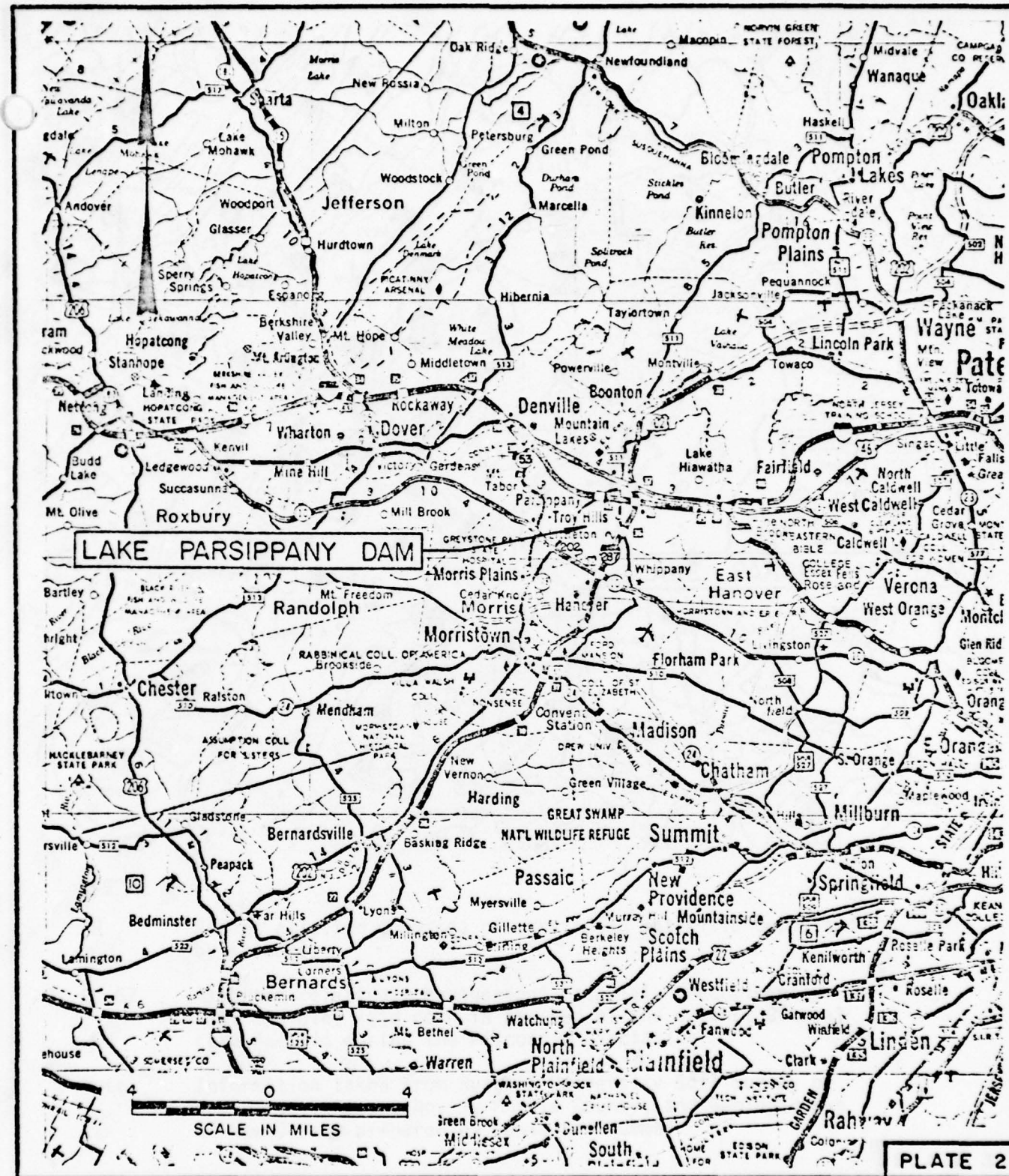


PLATE 2

STORCH ENGINEERS
FLORHAM PARK, NEW JERSEY

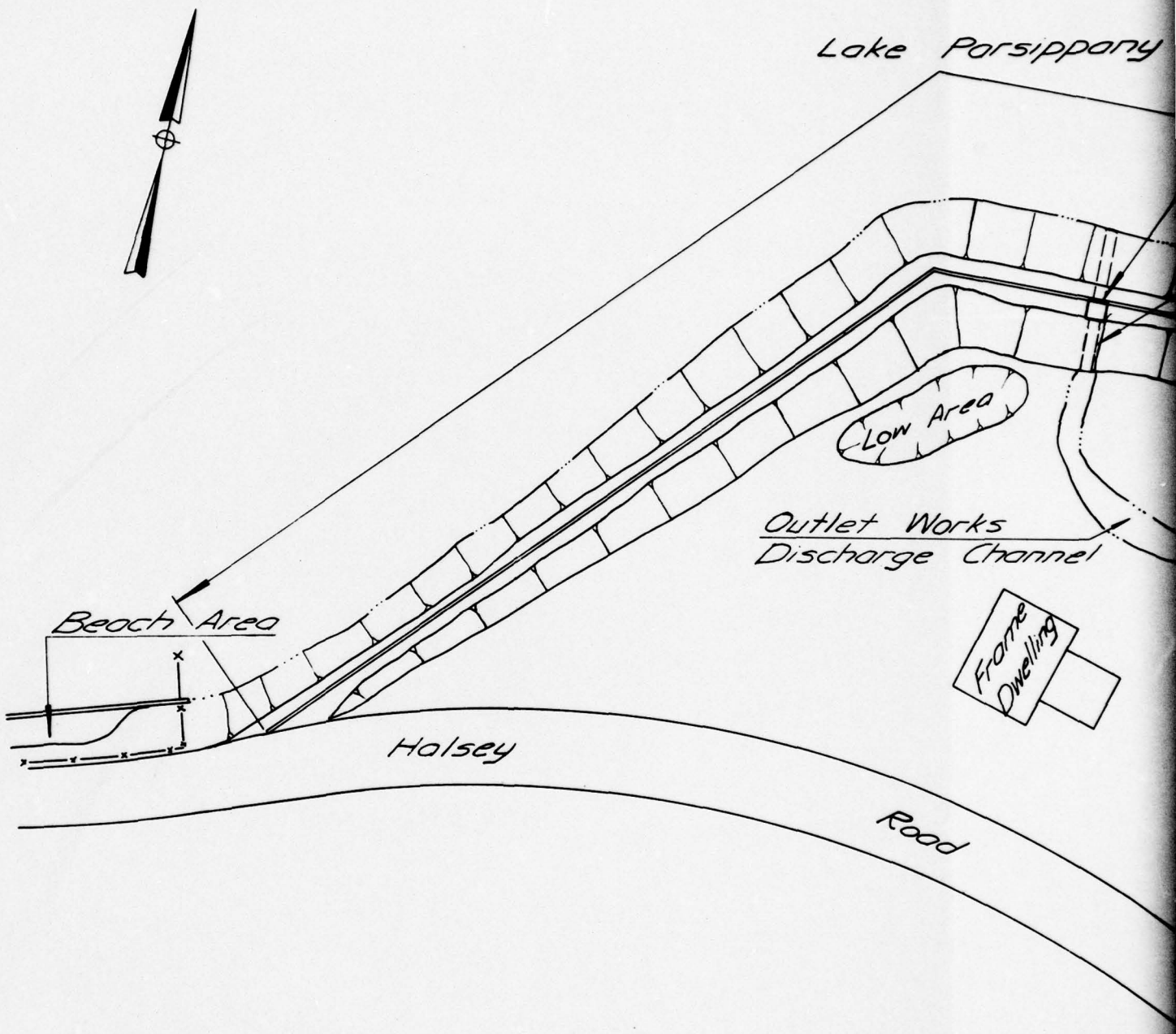
DIVISION OF WATER RESOURCES
N.J. DEPT. OF ENVIR. PROTECTION
TRENTON, NEW JERSEY

INSPECTION AND EVALUATION OF DAMS

VICINITY MAP

LAKE PARSIPPANY DAM

I.D. N.J. 00355	SCALE: AS SHOWN
	DATE: APRIL, 1979



Note: Information taken from plan by W. Wickstorm Jan. 1933 and field inspection Apr. 23, 1979.

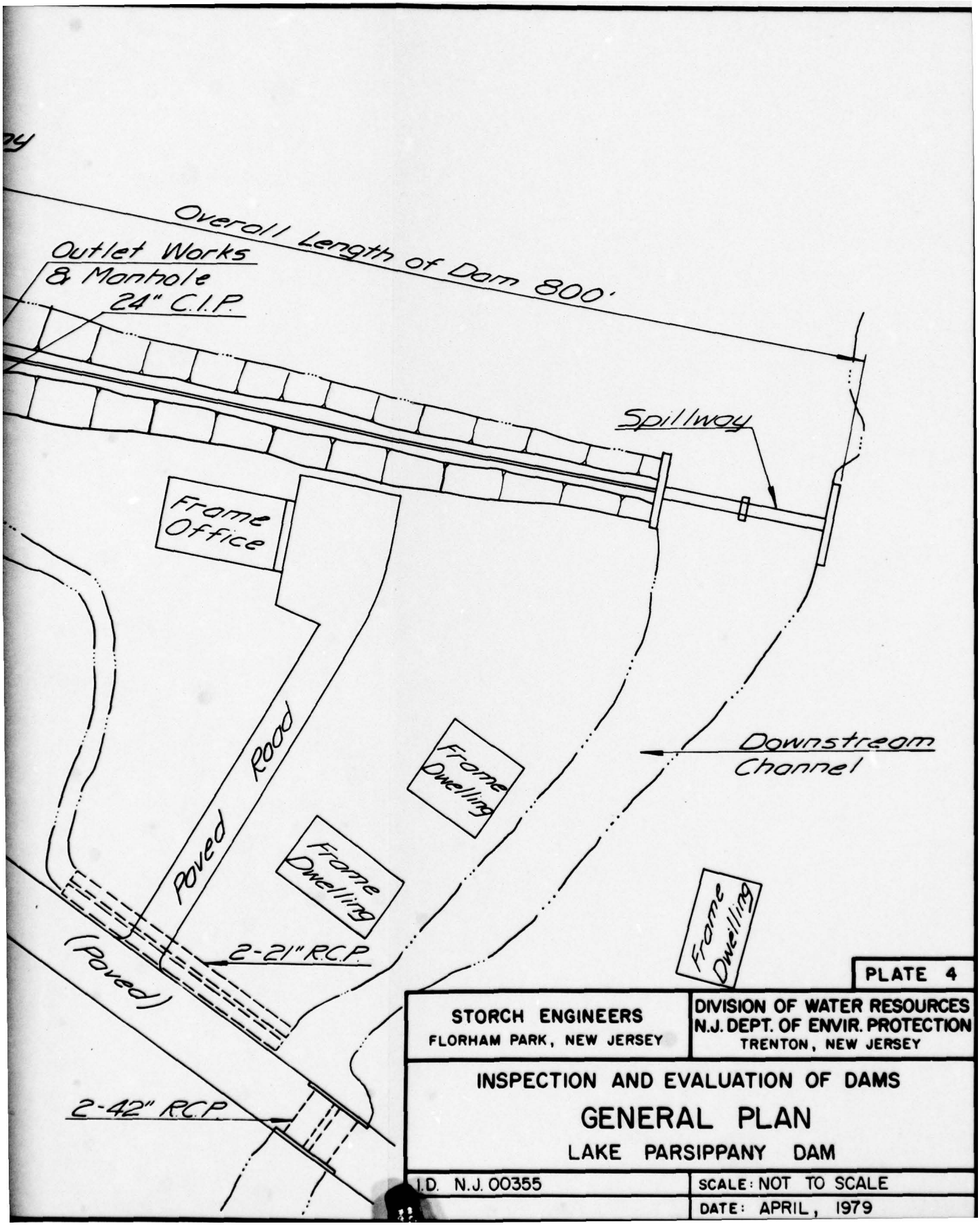


PLATE 4

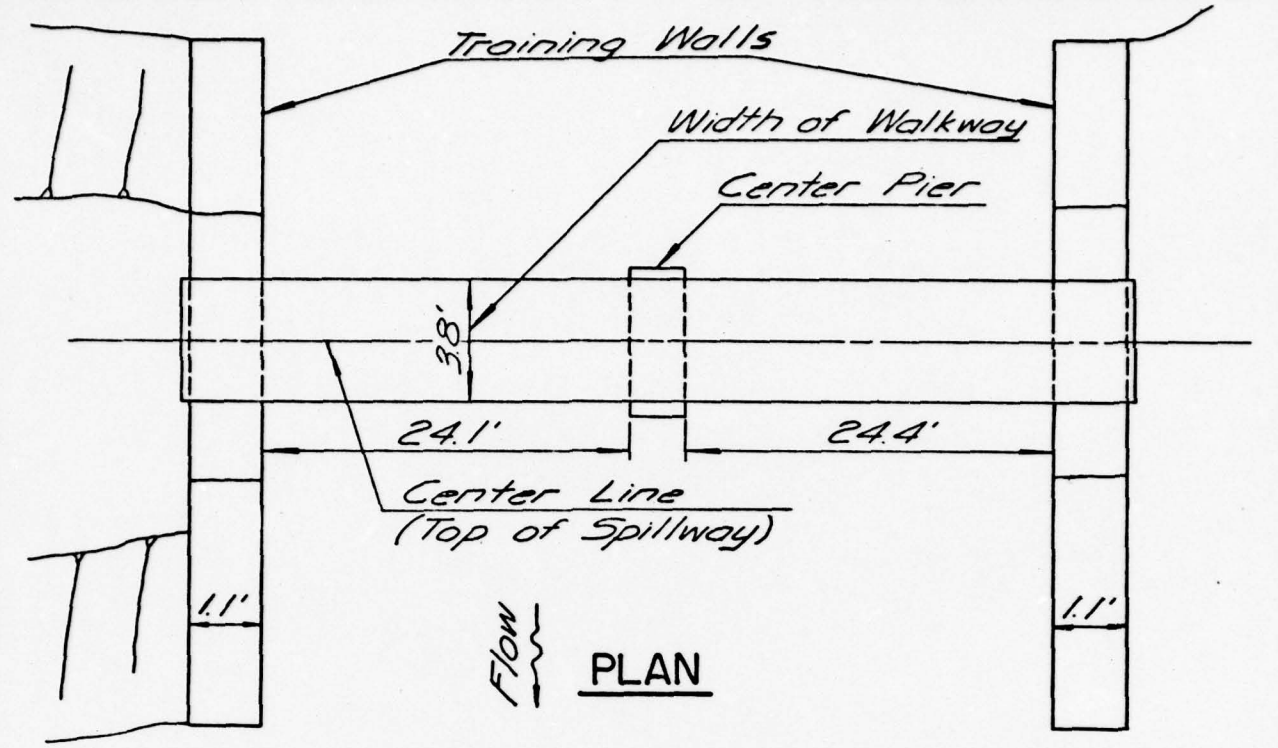
STORCH ENGINEERS FLORHAM PARK, NEW JERSEY	DIVISION OF WATER RESOURCES N.J. DEPT. OF ENVIR. PROTECTION TRENTON, NEW JERSEY

INSPECTION AND EVALUATION OF DAMS

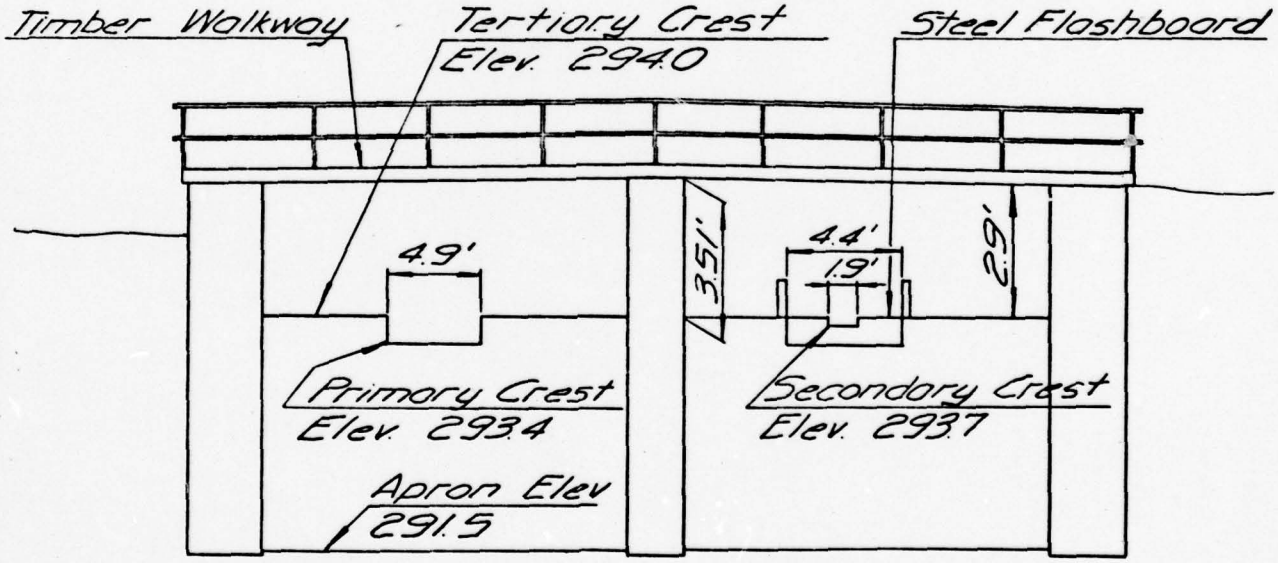
GENERAL PLAN

LAKE PARSIPPANY DAM

I.D. N.J. 00355	SCALE: NOT TO SCALE
	DATE: APRIL, 1979



PLAN

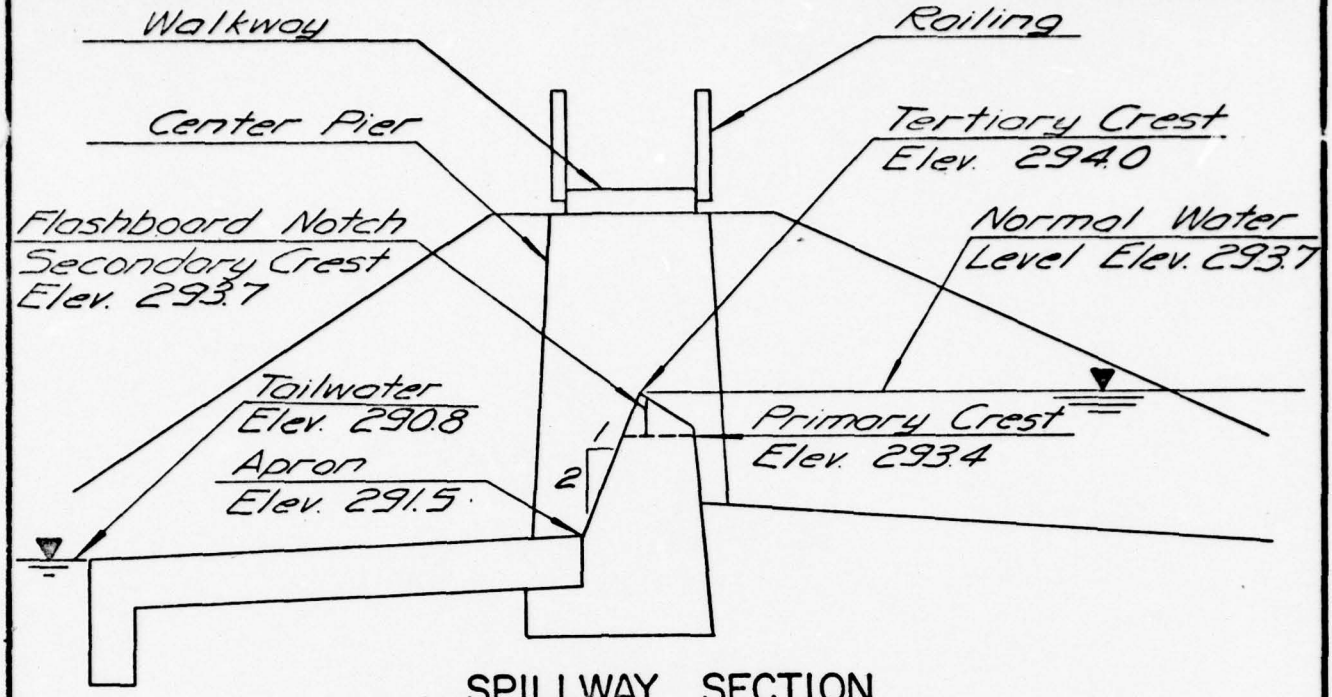


FRONT ELEVATION

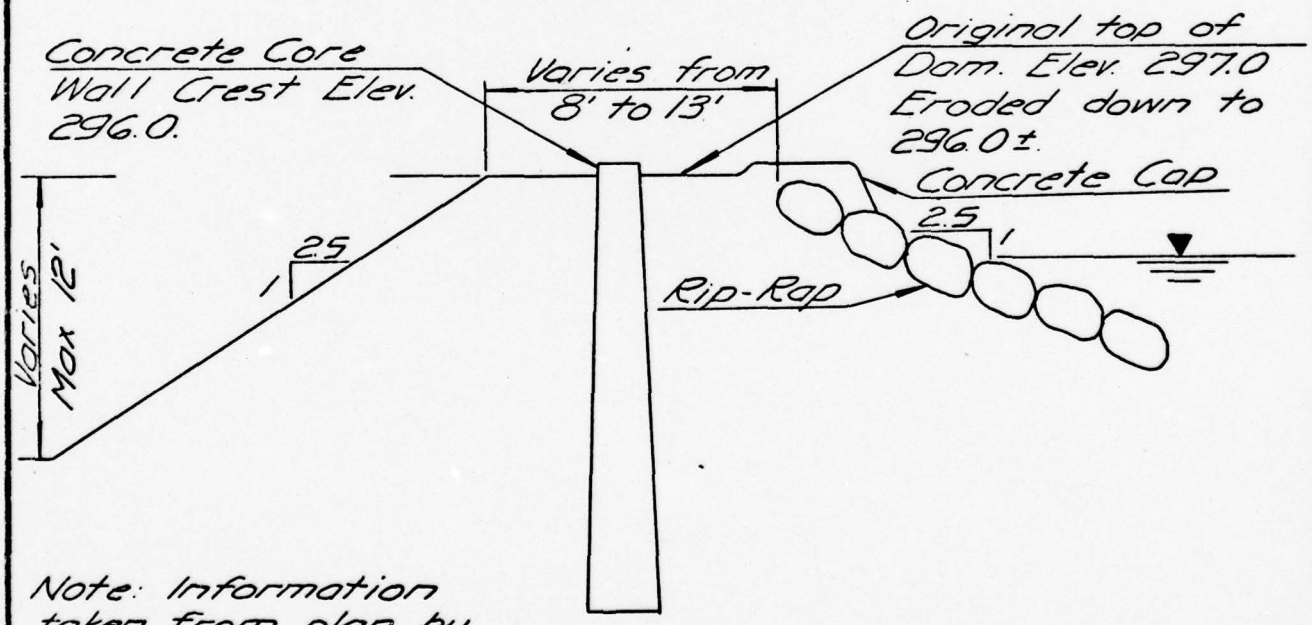
Note: Information taken from field inspection Apr. 23, 1979

PLATE 5

STORCH ENGINEERS FLORHAM PARK, NEW JERSEY	INSPECTION AND EVALUATION OF DAMS SPILLWAY PLAN & FRONT ELEVATION LAKE PARSIPPANY DAM
DIVISION OF WATER RESOURCES N.J. DEPT. OF ENVIR. PROTECTION TRENTON, NEW JERSEY	I.D. N.J 00355 — SCALE: NOT TO SCALE DATE: APRIL, 1979



SPILLWAY SECTION

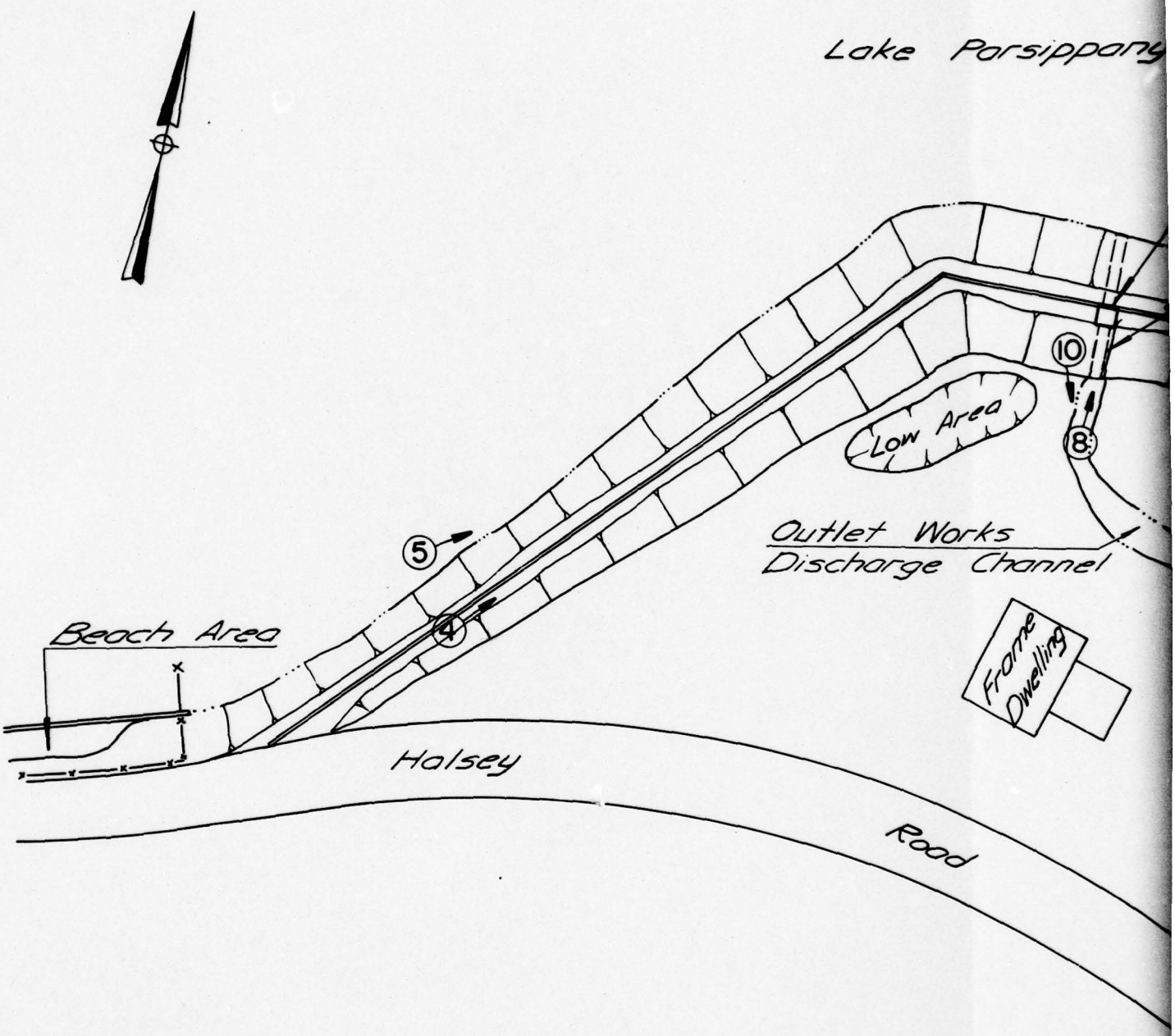


Note: Information taken from plan by W. Wickstorm, Jan. 1933 and field Inspection Apr. 23, 1979

DAM SECTION

PLATE 6

STORCH ENGINEERS FLORHAM PARK, NEW JERSEY	INSPECTION AND EVALUATION OF DAMS SECTIONS LAKE PARSIPPANY DAM
DIVISION OF WATER RESOURCES N.J. DEPT. OF ENVIR. PROTECTION TRENTON, NEW JERSEY	I.D. N.J. 00355 / SCALE: NOT TO SCALE DATE: APRIL, 1979



Note: Information taken from plan by W. Wickstorm Jan. 1933 and field inspection Apr. 23, 1979.

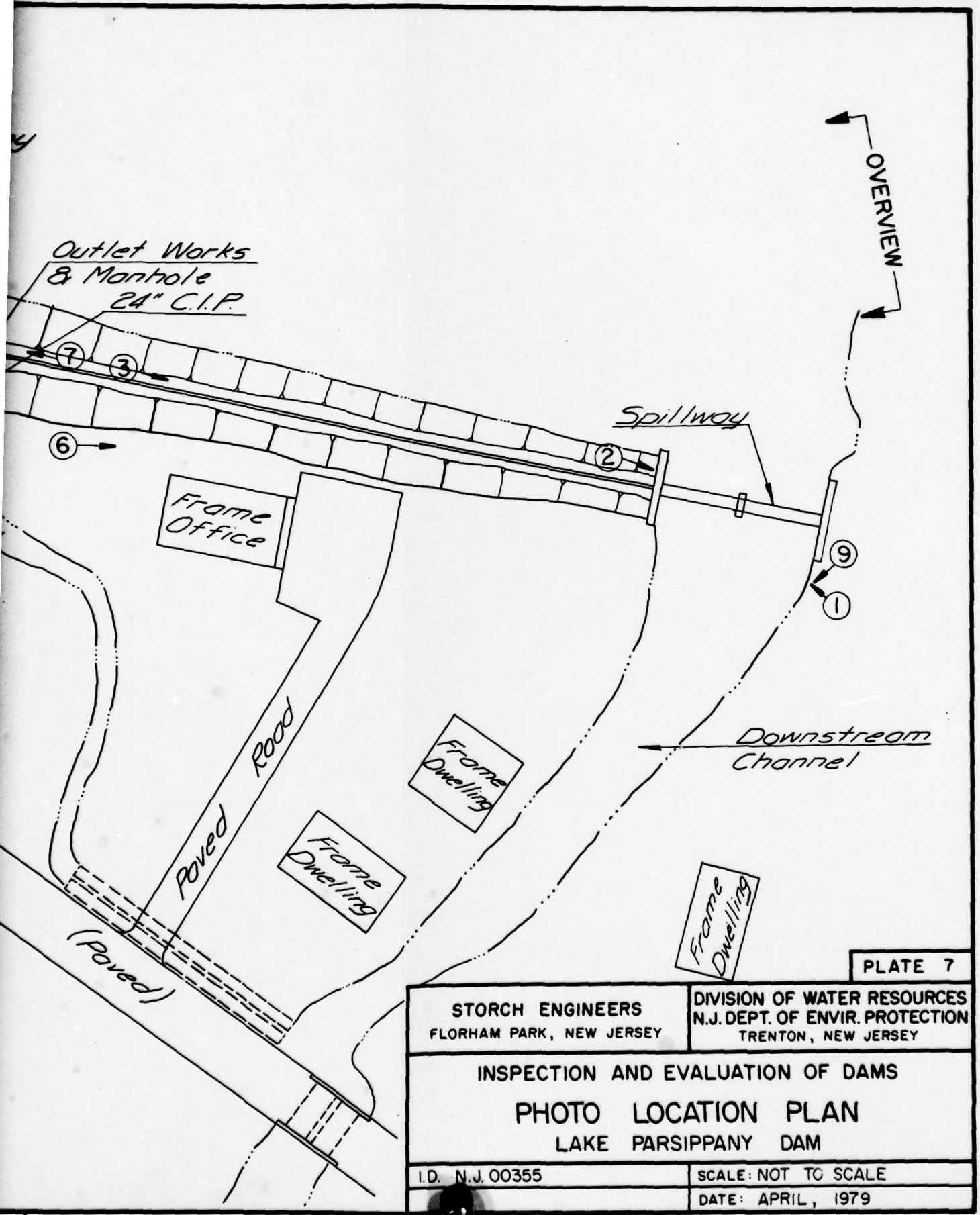


PLATE 7

STORCH ENGINEERS FLORHAM PARK, NEW JERSEY	DIVISION OF WATER RESOURCES N.J. DEPT. OF ENVIR. PROTECTION TRENTON, NEW JERSEY

INSPECTION AND EVALUATION OF DAMS

PHOTO LOCATION PLAN

LAKE PARSIPPANY DAM

I.D. N.J. 00355	SCALE: NOT TO SCALE
	DATE: APRIL, 1979

2

APPENDIX 1

Check List - Visual Inspection

Check List - Engineering Data

Check List
Visual Inspection
Phase I

Name of Dam Lake Parsippany County Morris State New Jersey Coordinators NJDEP

Date(s) Inspection 4-23-79 Weather Fair Temperature 80°F

Pool Elevation at Time of Inspection 293.7 M.S.L. Tailwater at Time of Inspection 290.8 M.S.L.

Inspection Personnel:

Richard McDermott	Dave Hoyt	
John Gribbin	Joe Fox	
Ronald Lai		

Ronald Lai Recorder

Present: Allan Blake, Lake Superintendent, Lake Parsippany Property Association

CONCRETE/MASONRY DAMS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
GENERAL	N.A.	
STRUCTURE TO ABUTMENT/EMBANKMENT JUNCTIONS	N.A.	
DRAINS	N.A.	
WATER PASSAGES	N.A.	
FOUNDATION	N.A.	
VERTICAL AND HORIZONTAL ALIGNMENT	N.A.	

CONCRETE/MASONRY DAMS

ISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
URFACE CRACKS ONCRETE SURFACES	N.A.	
TRUCTURAL CRACKING	N.A.	
ONSTRUCTION JOINTS	N.A.	
IONOLITH JOINTS	N.A.	
EAKAGE	N.A.	
EEPAGE	N.A.	

EMBANKMENT

ISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
ENERAL	Large trees are located on side slopes. Crest is generally bare. Downstream slope generally grass covered with trees and brush in some areas.	A low area at the downstream toe of dam at the bend point does not drain properly. A drainage system should be provided to prevent standing water.
UNCTION OF EMBANKMENT ND ABUTMENT, SPILLWAY ND DAM	Considerable erosion of embankment crest at junction with west wingwall.	
NY NOTICEABLE SEEPAGE	None	
TAFF GAGE AND RECORDER	None	
RAINS	None	

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	None	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	None	
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	Top of embankment severely eroded along entire length. Conc. core wall exposed for majority of length of dam.	Exposed top of conc. core wall in good condition.
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST	Uneven vertical alignment and top width due to erosion and pedestrian action.	Horizontal alignment appears to be in conformance with construction drawings.
RIPRAP FAILURES	Portions of riprap out of place on upstream face of embankment. Concrete cap on riprap is uneven and extensively cracked and undermined.	Riprap below water line in good condition Some large trees growing through concrete cap on riprap.

OUTLET WORKS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE SURFACES IN OUTLET CONDUIT	N.A.	
INTAKE STRUCTURE	Submerged	
OUTLET STRUCTURE	24" C.I.P. discharge pipe heavily silted. Riprap headwall at outlet end in deteriorated condition.	
OUTLET CHANNEL	Channel heavily silted. Accumulated debris causes partial obstruction.	Riprap lining on east side in good condition.
GATE AND GATE HOUSING	Gate operating mechanism appears to be in good condition. Manhole in good condition. Metal steps severely rusted and broken.	Gate operating mechanism not operated at time of inspection. The manhole steps are rusted and unable to support a person's weight; they are considered hazardous and should be removed or replaced.

SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	Concrete surface generally in good condition. Some minor cracks. East notch fitted with steel notched flash board. West notch open; one flash board support broken off. Apron is structurally sound; surface eroded and spalled.	Lake discharge flowing through west notch.
APPROACH CHANNEL	N.A.	
DISCHARGE CHANNEL	Rocks of all sizes and trees near the spillway; and debris near culverts under roadway located approx. 200 ft. downstream.	
BRIDGE AND PIERS	Training walls and center pier cracked and severely spalled. Some spalls have been patched. Some reinforcing exposed. Timber walkway platform sound.	Railing of walkway is loose and hazardous. High step at west end of walkway considered hazardous.

INSTRUMENTATION

VISUAL EXAMINATION	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
MONUMENTATION/SURVEYS	N.A.	
OBSERVATION WELLS	N.A.	
WEIRS	N.A.	
PIEZOMETERS	N.A.	
OTHER	N.A.	

RESERVOIR

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	Slope of lake banks approx. 4%.	
SEDIMENTATION	Not known.	
STRUCTURES ALONG BANKS	Homes are located along banks all around lake. Many homesites include docks and other lake related structures at the shoreline.	

DOWNSTREAM CHANNEL

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	Many rocks and several trees present significant obstructions.	
SLOPES	Side slopes: 25% to 34% Longitudinal channel gradient: 1% to 2%	
STRUCTURES ALONG BANKS	Four homes within 270 feet of dam. Three of these are along bank of downstream channel. Ground elevations at these three homes is 4 to 6 feet above the channel bed.	Real Estate office located approx. 30 feet downstream of dam.

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION

ITEM	REMARKS
DAM - PLAN SECTIONS	Plans titled "Proposed Dam and Dykes, Halseytown, Parsippany-Troy Hills Township, Morris County, N.J." (4 sheets) prepared by W. Wickstrom, dated Jan. 6, 1933.
SPILLWAY - PLAN	Available in Wickstrom drawings.
SECTIONS	
DETAILS	
OPERATING EQUIPMENT PLANS & DETAILS	Not Available
OUTLETS - PLAN	Plan by Wickstrom
DETAILS	
CONSTRAINTS	
DISCHARGE RATINGS	Discharge under 2' head given by Wickstrom Application
HYDRAULIC/HYDROLOGIC DATA	Limited (NJDEP file)
RAINFALL/RESERVOIR RECORDS	Not Available
CONSTRUCTION HISTORY	Limited (NJDEP file)
LOCATION MAP	Available in Wickstrom drawings.

ITEM	REMARKS
MONITORING SYSTEMS	None
MODIFICATIONS	Available in NJDEP file (Limited)
HIGH POOL RECORDS	Available in NJDEP file (Limited)
POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS	One Annual Report by Wilbur F. Downing, Jr., 10-25-1968 One Report on Structural Analysis of the dam by Alpern and Soifer, Consulting Engineers, February 26, 1975.
PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS	None
MAINTENANCE OPERATION RECORDS	Limited drawdown record. One dam repair record completed in Sept. 19, 1933

ITEM	REMARKS
DESIGN REPORTS	Not available
GEOLOGY REPORTS	Not available
DESIGN COMPUTATIONS	
HYDROLOGY & HYDRAULICS	Limited in NJDEP file
DAM STABILITY	Not available
SEEPAGE STUDIES	Not available
MATERIALS INVESTIGATIONS	Report by Joseph S. Ward, Inc., dated Feb. 24, 1975.
BORING RECORDS	Inspection Reports in NJDEP file (limited).
LABORATORY	
FIELD	
POST-CONSTRUCTION SURVEYS OF DAM	Topographic Survey by Bowe, Walsh & Associates.
BORROW SOURCES	Lake bottom 100 feet and more upstream from dam toe Inspection report in NJDEP file.

APPENDIX 2

Photographs

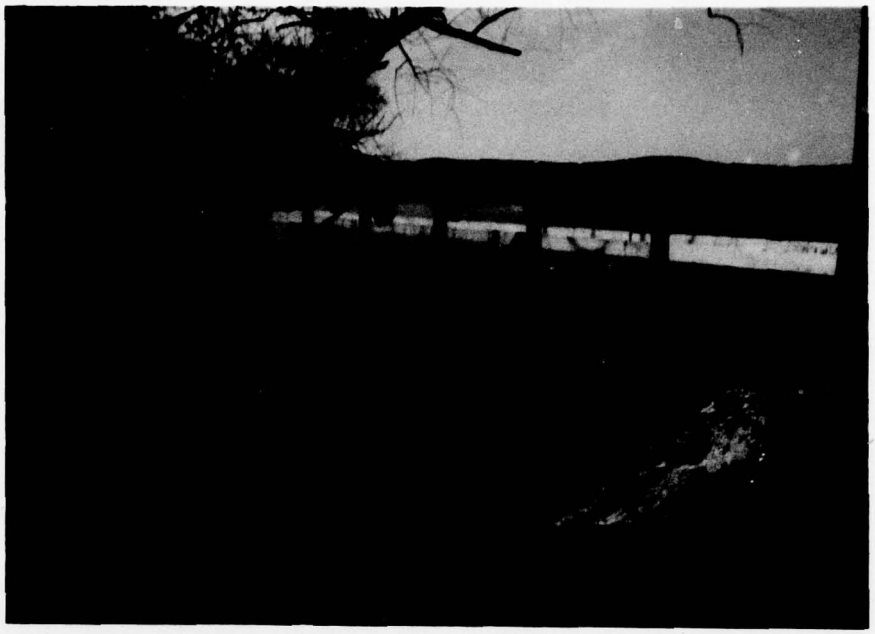


PHOTO 1

SPILLWAY

PHOTO 2

DETERIORATION OF CONCRETE AT SPILLWAY

LAKE PARSIPPANY DAM
23 APRIL 1979

PHOTO 3

CREST OF DAM - EAST END

PHOTO 4

CREST OF DAM - WEST END

LAKE PARSIPPANY DAM
23 APRIL 1979

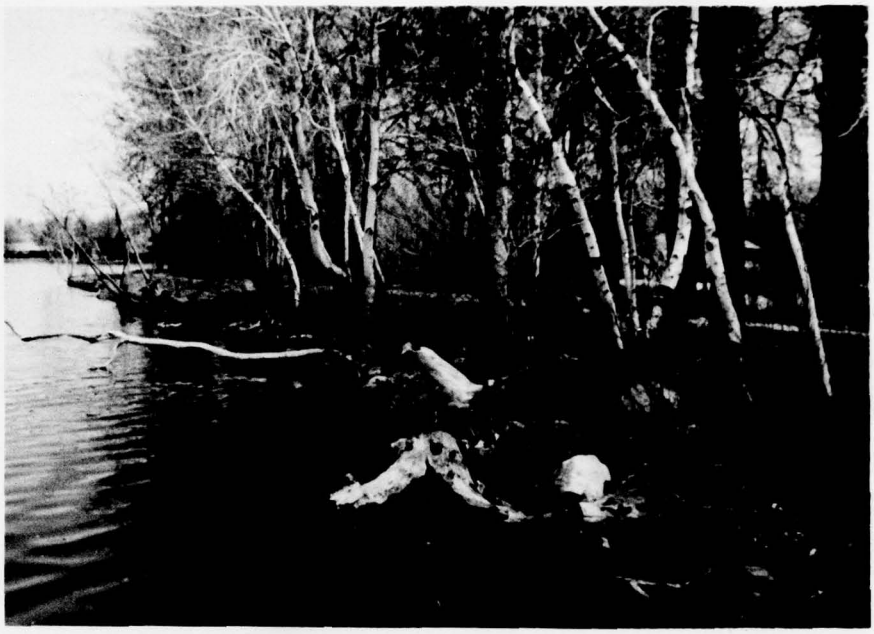


PHOTO 5

UPSTREAM FACE OF DAM - WEST END

PHOTO 6

DOWNSTREAM FACE OF DAM

LAKE PARSIPPANY DAM
23 APRIL 1979

PHOTO 7

OUTLET WORKS OPERATING MECHANISM

PHOTO 8

OUTLET WORKS DISCHARGE PIPE

LAKE PARSIPPANY DAM
23 APRIL 1979

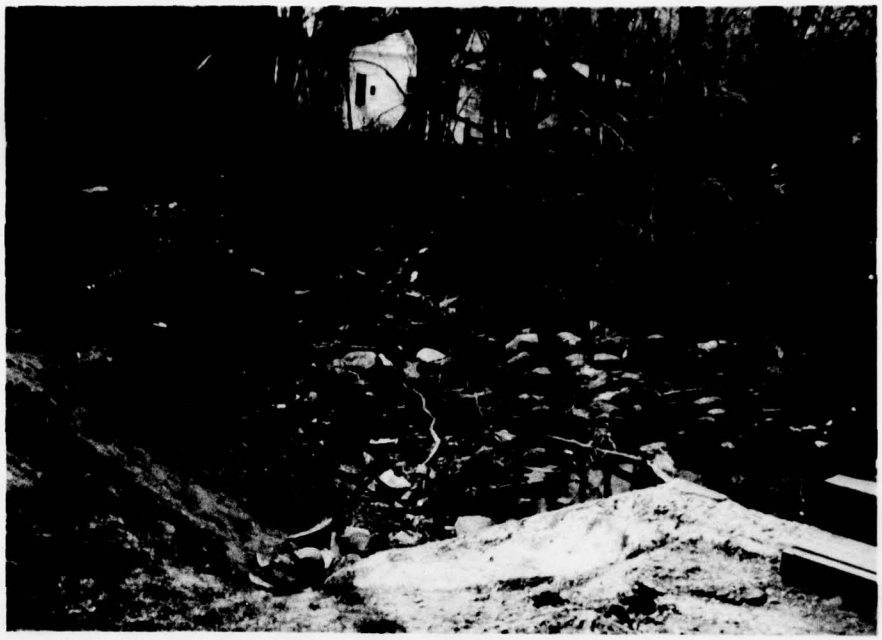


PHOTO 9

DOWNSTREAM CHANNEL AT SPILLWAY

PHOTO 10

DISCHARGE CHANNEL FOR OUTLET WORKS

LAKE PARSIPPANY DAM
23 APRIL 1979

APPENDIX 3

Engineering Data

CHECK LIST

HYDROLOGIC AND HYDRAULIC DATA

ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: Predominantly Residential

ELEVATION TOP NORMAL POOL (STORAGE CAPACITY): 293.7 (500 Ac-ft)

ELEVATION TOP FLOOD CONTROL POOL (STORAGE CAPACITY): N.A.

ELEVATION MAXIMUM DESIGN POOL: 296.1

ELEVATION TOP DAM: 296.0

SPILLWAY CREST: Overflow concrete weir with notched flash board

a. Elevation 293.4 (Primary) 293.7 (Secondary) 294 (Tertiary)

b. Type Triangular cross section

c. Width N.A.

d. Length 48.5 ft (Total)

e. Location Spillover Over crest of spillway

f. Number and Type of Gates N.A.

OUTLET WORKS: 1-24" CIP

a. Type Cast Iron Pipe with control gate

b. Location Approx 400 ft. west of Spillway

c. Entrance inverts 284.4

d. Exit inverts 283.7

e. Emergency draindown facilities: Raise control gate

HYDROMETEOROLOGICAL GAGES: None

a. Type N.A.

b. Location N.A.

c. Records N.A.

MAXIMUM NON-DAMAGING DISCHARGE:

(Lake stage equal to top of dam) 514 c.f.s.

APPENDIX 4

Hydrologic Computations

STORCH ENGINEERS

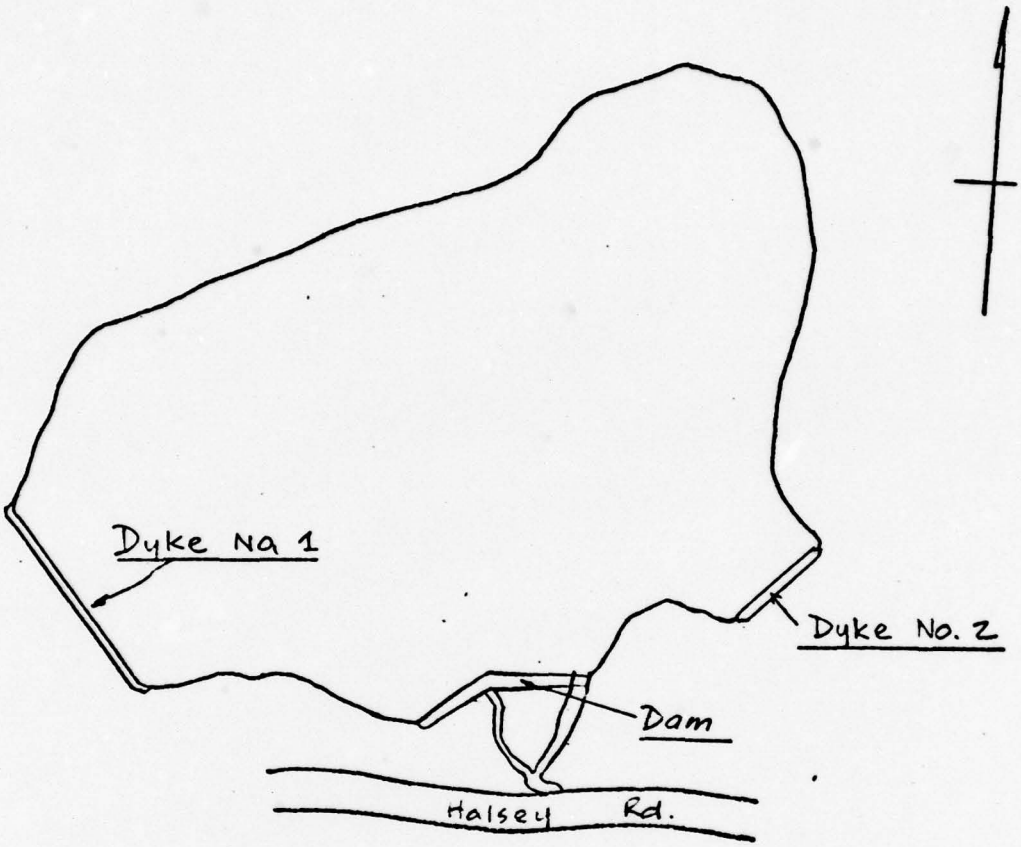
Sheet 1 of 11

Project Lake Parsippany Dam

Made By RL Date 5-11-79

1132 B

Chkd By DMP Date 5-16-79



Overall Plan of Lake Parsippany

Length of Dam	750 feet	
Length of Dyke No. 1	1150 feet	
Length of Dyke No. 2	460 feet	
Length of overflow areas	175 feet	
Original design dam crest elev.	297.0	MSL
Existing dam crest elev.	296.0	MSL
Normal pool elev.	294.0	MSL

Overtopping will occur along the dam and two dykes at the same time. The effective overtopped length of the dam = 2535 feet

Hydrologic Analysis

Inflow hydrograph for Lake Parsippany to be computed by HEC-1-DB program using SCS triangular unit hydrograph and routed by the modified Puls method.

Drainage Area = 1.12 sq. mi.

Infiltration Data

Drainage area is heavily populated.

use initial infiltration 1.0 in

constant infiltration 0.1 in/hr.

Time of concentration By SCS TR-55

Length of overland flow = 4013 ft.

vel. of travel = 1.2 ft/sec

slope = 2.8 %

Tc = 3344 sec
0.93 hr.

Time of Concentration By "Design of Small Dam" SCS Nomograph

H = 26'

L = 4013 ft.

Tc = 0.58 hr.

Time of concentration

Ref. Pg. 14-36 "Handbook of Applied Hydrology" by Chow

$$t_c^{2.14} = \frac{2}{3}\,\frac{Ln}{\sqrt{S}}$$

t_c = time of concentration in min.

L = length of overland flow in ft

S = Slope

n = 0.4 Roughness coef. for grass

t_c = 1 hr.

For input

use T_c = 0.9 hr.

Lag = 0.54 hr.

Lake Storage Volume

Information from USGS & Aerial photos

Elev. (M.S.L)	Surface Area (Ac)
284	0
294	151
300	354
320	496

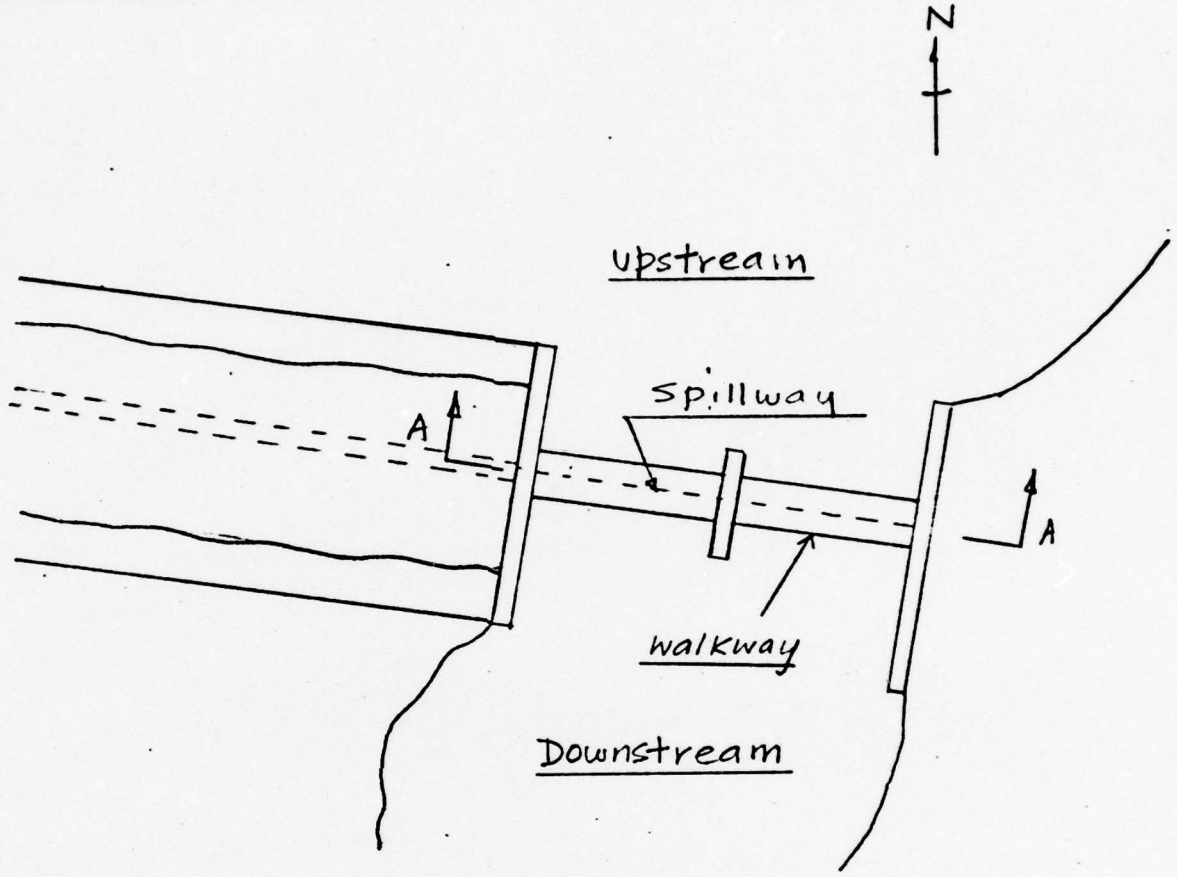
HEC-1-DB program will develope storage capacity from surface area and elev.

STORCH ENGINEERS

Sheet 6 of 11

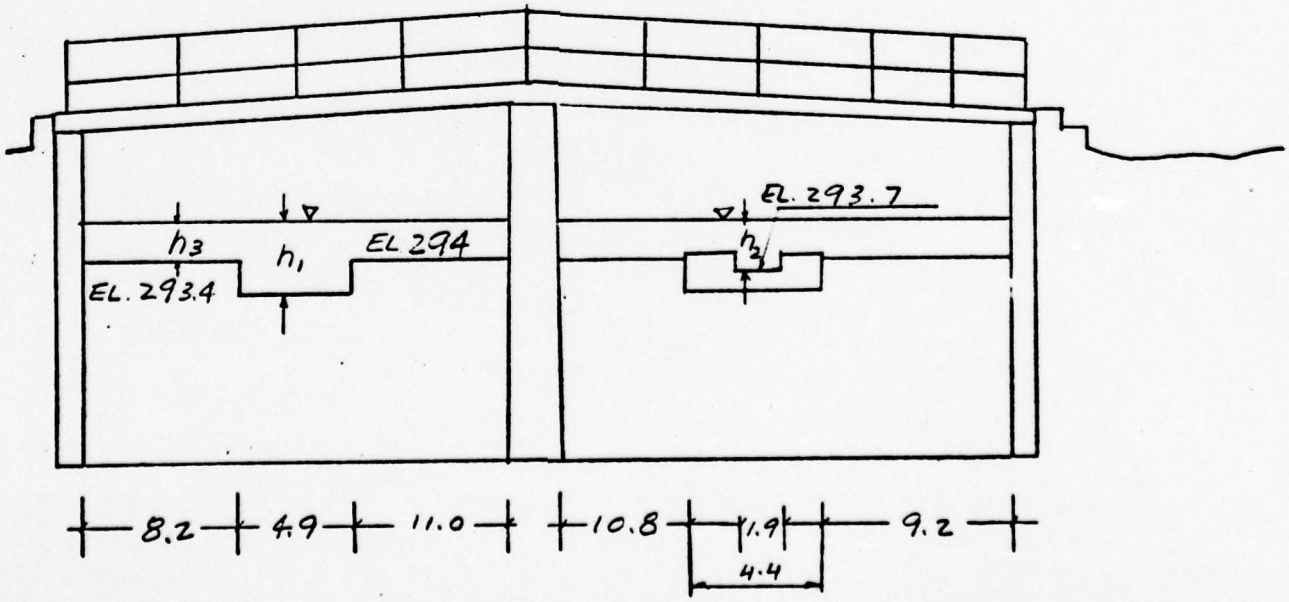
Project Lake Parsippany Dam — Made By RL Date 4-26-79

1132B — Chkd By DMP Date 4-27-79



SPILLWAY PLAN

Not to scale



SECTION A-A

Spillway Discharge

Spillway discharge flows over weirs at three levels with effective lengths L_1, L_2 and L_3 respectively. All three are assumed to be weirs with triangular sections and coef. $C = 3.6$ and discharge given by:

$$Q = c L h^{3/2}$$

Ref. Pg 5-48 Handbook of Hydraulics King et al.

At water elevation = 297, tailwater is estimated to be 3.6 ft. by using Manning's formula and downstream sections. An adjustment factor 0.94 is applied to the discharge Ref. Pg 5-18 (King et al.)

Weir crest elev.		Effective length in ft.
Primary	293.4	$L_1 = 4.9$
Secondary	293.7	$L_2 = 1.9$
Tertiary	294.0	$L_3 = 40.9$

Stage Discharge Tabulation

W.L. Elev.	h_1	h_2 (ft.)	h_3	Q_1	Q_2 (cfs)	Q_3	ΣQ
293.4	0	0	0	0	0	0	0
293.7	0.3	0	0	3	0	0	3
294.5	1.1	0.8	0.5	20	5	52	77
295.0	1.6	1.3	1.0	36	10	147	193
296.0	2.6	2.3	2.0	74	24	416	514
297.0	3.6	3.3	3.0	121	41	765	870

STORCH ENGINEERS

Sheet 9 of 11

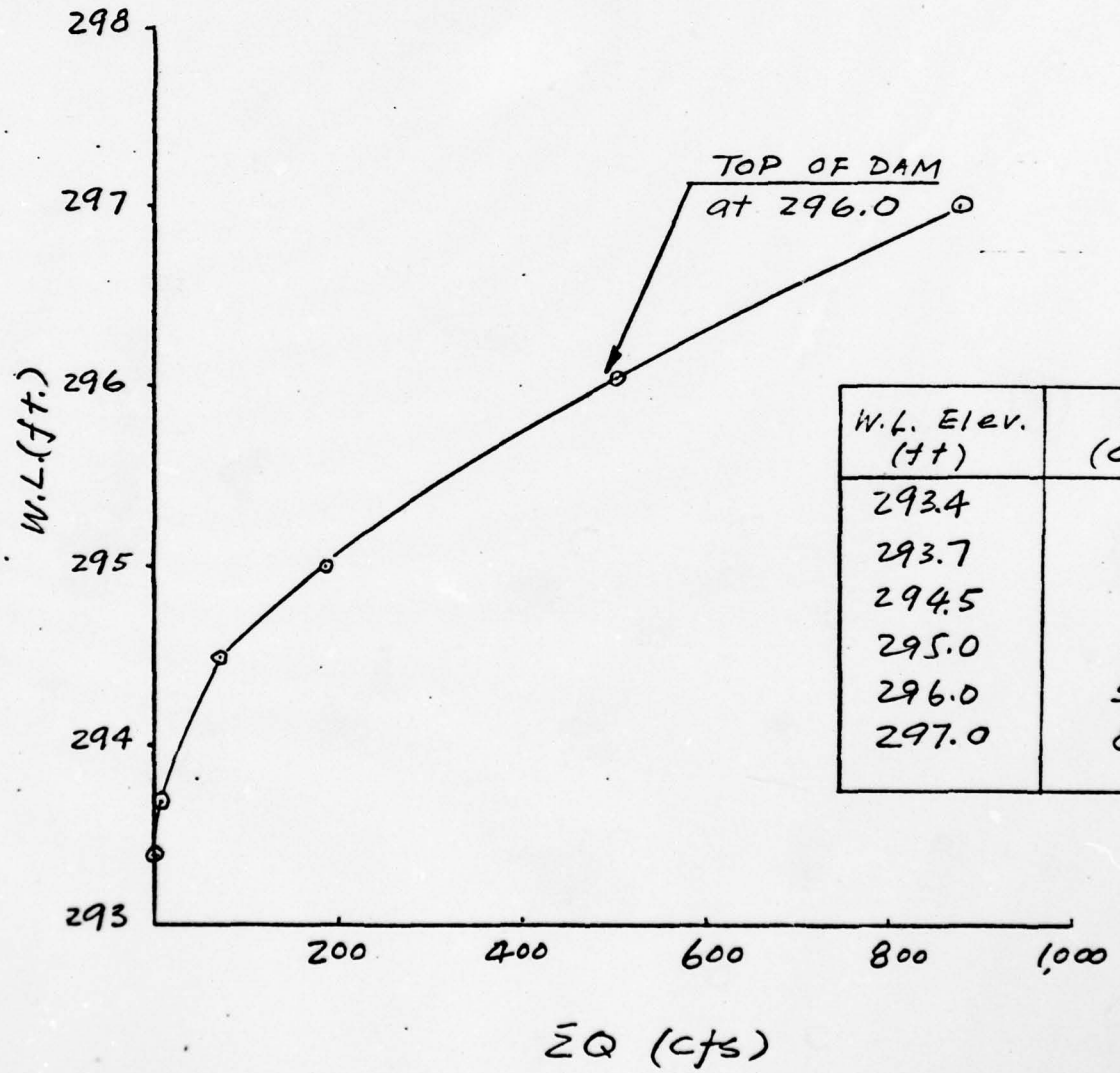
Project Lake Parsippany Dam 1132 B

Made By RL Date 4-26-79

Chkd By DMP Date 4-27-79

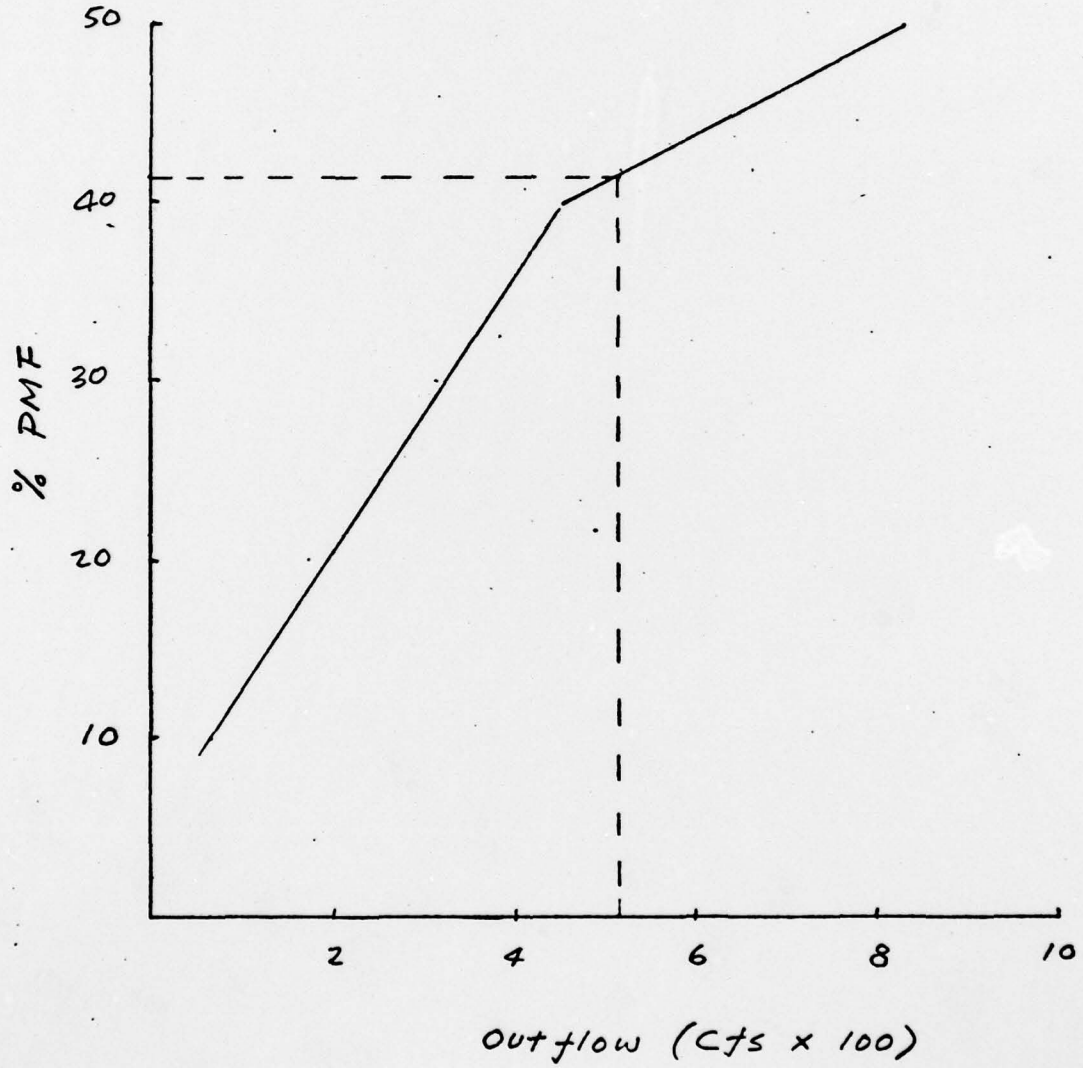
Stage–Discharge Curve

for spillway



W.L. Elev. (ft)	Q (cfs)
293.4	0
293.7	3
294.5	77
295.0	193
296.0	514
297.0	870

Overtopping Potential



Overtopping occurs at elev. 296 with Q = 514 cfs

∴ Dam can pass approximately 41.5 % PMF

STORCH ENGINEERS

Sheet 11 of 11

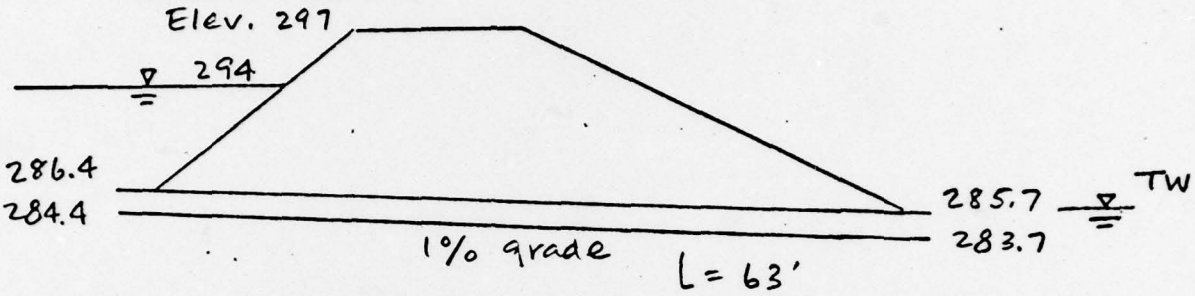
Project Lake Parsippany Dam

Made By RL Date 5-11-79

Chkd By DMP Date 5-16-79

Outlet Works Capacity

Outlet works =



24" C.I.P. at 1% grade submerged outlet

$HW = H + h_o - LS_o$ Ref 5-9 see ref. below

$H = HW - h_o + LS_o$

$= 9.6 - 2 + 63'(0.01)$

$= 8.23$

From outlet control nomograph for $n = 0.012$

Pg 5-32 "Hydraulic Charts for the Selection of Highway Culverts"

$Q = \underline{\underline{48}}$ cfs maximum capacity

$Q = \underline{\underline{24}}$ cfs ± max. discharge used.

HEC-1-DB COMPUTATIONS

```
A1                                NATIONAL DAM SAFETY PROGRAM
A2                          LAKE PARSIPPANY DAM          NEW JERSEY
A3                                MULTI RATIO PMF ROUTING
3       150         0          5                                    0         0         3
3l        5
J         1         5          1
J1      0.5       0.4        0.3       0.2       0.1
K         0      LAKE                                0         1
K1                        INFLOW HYDROGRAPH TO LAKE PARSIPPANY DAM
M         1         2       1.12                 1.12         0                        1
O         0        25        100       109        117
T                                                                1.0       0.1
N2                0.54
X      -1.0     -0.05        2.0
K         1       DAM                                0         1
K1                        ROUTE DISCHARGE THROUGH DAM
Y                                          1         1
Y1        1                                                   -293.7        -1
Y4    293.4     293.7      294.5     295.0     296.0     297.0
Y5        0         3         77       193       514       870
Y6        0       151        354       496
Y7      284       294        300       320
Y8    293.4
Y0      296      2.63        1.5      2535
K        99
A
A
A
A
A
```

```
**********
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION      JULY 1978
  LAST MODIFICATION  26 FEB 79
**********

RUN  DATE= 79/05/04.
     TIME= 10.38.34.
```

NATIONAL DAM SAFETY PROGRAM
LAKE PARSIPPANY DAM NEW JERSEY
MULTI RATIO PMF ROUTING

JOB SPECIFICATION

NQ	NHR	NMIN	IDAY	IHR	IMIN	METRC	IPLT	IPRT	NSTAN
150	0	5	0	0	0	0	0	3	0
			JOPER	NWT	LROPT	TRACE			
			5	0	0	0			

MULTI-PLAN ANALYSES TO BE PERFORMED
NPLAN= 1 NRTIO= 5 LRTIO= 1

RTIOS= .50 .40 .30 .20 .10

********** ********** ********** ********** **********

SUB-AREA RUNOFF COMPUTATION

INFLOW HYDROGRAPH TO LAKE PARSIPPANY DAM

ISTAO	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
LAKE	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	2	1.12	0.00	1.12	0.00	0.000	0	1	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	25.00	100.00	109.00	117.00	0.00	0.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS .800

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	1.00	.10	0.00	0.00

UNIT HYDROGRAPH DATA
TC= 0.00 LAG= .54

RECESSION DATA
STRTQ= -1.00 QRCSN= -.05 RTIOR= 2.00

UNIT HYDROGRAPH 34 END OF PERIOD ORDINATES, TC= 0.00 HOURS, LAG= .54 VOL= 1.00

56.	165.	333.	566.	779.	898.	930.	895.	807.	695.
548.	415.	328.	258.	210.	167.	130.	103.	82.	65.
51.	41.	32.	26.	20.	16.	13.	10.	9.	7.
5.	4.	3.	1.						

END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
1.01	.05	1	.01	0.00	.01	1.
1.01	.10	2	.01	0.00	.01	1.
1.01	.15	3	.01	0.00	.01	1.
1.01	.20	4	.01	0.00	.01	1.
1.01	.25	5	.01	0.00	.01	1.
1.01	.30	6	.01	0.00	.01	1.
1.01	.35	7	.01	0.00	.01	1.
1.01	.40	8	.01	0.00	.01	1.
1.01	.45	9	.01	0.00	.01	1.
1.01	.50	10	.01	0.00	.01	1.
1.01	.55	11	.01	0.00	.01	1.
1.01	1.00	12	.01	0.00	.01	0.
1.01	1.05	13	.01	0.00	.01	0.
1.01	1.10	14	.01	0.00	.01	0.
1.01	1.15	15	.01	0.00	.01	0.
1.01	1.20	16	.01	0.00	.01	0.
1.01	1.25	17	.01	0.00	.01	0.
1.01	1.30	18	.01	0.00	.01	0.
1.01	1.35	19	.01	0.00	.01	0.
1.01	1.40	20	.01	0.00	.01	0.
1.01	1.45	21	.01	0.00	.01	0.
1.01	1.50	22	.01	0.00	.01	0.
1.01	1.55	23	.01	0.00	.01	0.
1.01	2.00	24	.01	0.00	.01	0.
1.01	2.05	25	.01	0.00	.01	0.
1.01	2.10	26	.01	0.00	.01	0.
1.01	2.15	27	.01	0.00	.01	0.
1.01	2.20	28	.01	0.00	.01	0.
1.01	2.25	29	.01	0.00	.01	0.
1.01	2.30	30	.01	0.00	.01	0.
1.01	2.35	31	.01	0.00	.01	0.
1.01	2.40	32	.01	0.00	.01	0.
1.01	2.45	33	.01	0.00	.01	0.
1.01	2.50	34	.01	0.00	.01	0.
1.01	2.55	35	.01	0.00	.01	0.
1.01	3.00	36	.01	0.00	.01	0.
1.01	3.05	37	.01	0.00	.01	0.
1.01	3.10	38	.01	0.00	.01	0.
1.01	3.15	39	.01	0.00	.01	0.
1.01	3.20	40	.01	0.00	.01	0.
1.01	3.25	41	.01	0.00	.01	0.
1.01	3.30	42	.01	0.00	.01	0.
1.01	3.35	43	.01	0.00	.01	0.
1.01	3.40	44	.01	0.00	.01	0.
1.01	3.45	45	.01	0.00	.01	0.
1.01	3.50	46	.01	0.00	.01	0.
1.01	3.55	47	.01	0.00	.01	0.
1.01	4.00	48	.01	0.00	.01	0.
1.01	4.05	49	.01	0.00	.01	0.
1.01	4.10	50	.01	0.00	.01	0.
1.01	4.15	51	.01	0.00	.01	0.
1.01	4.20	52	.01	0.00	.01	0.
1.01	4.25	53	.01	0.00	.01	0.
1.01	4.30	54	.01	0.00	.01	0.
1.01	4.35	55	.01	0.00	.01	0.
1.01	4.40	56	.01	0.00	.01	0.
1.01	4.45	57	.01	0.00	.01	0.
1.01	4.50	58	.01	0.00	.01	0.
1.01	4.55	59	.01	0.00	.01	0.
1.01	5.00	60	.01	0.00	.01	0.
1.01	5.05	61	.01	0.00	.01	0.
1.01	5.10	62	.01	0.00	.01	0.
1.01	5.15	63	.01	0.00	.01	0.
1.01	5.20	64	.01	0.00	.01	0.
1.01	5.25	65	.01	0.00	.01	0.
1.01	5.30	66	.01	0.00	.01	0.
1.01	5.35	67	.01	0.00	.01	0.
1.01	5.40	68	.01	0.00	.01	0.
1.01	5.45	69	.01	0.00	.01	0.
1.01	5.50	70	.01	0.00	.01	0.
1.01	5.55	71	.01	0.00	.01	0.
1.01	6.00	72	.01	0.00	.01	0.
1.01	6.05	73	.03	0.00	.03	0.
1.01	6.10	74	.03	0.00	.03	0.
1.01	6.15	75	.03	0.00	.03	0.

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
1.01	6.20	76	.03	0.00	.03	0.
1.01	6.25	77	.03	0.00	.03	0.
1.01	6.30	78	.03	0.00	.03	0.
1.01	6.35	79	.03	0.00	.03	0.
1.01	6.40	80	.03	0.00	.03	0.
1.01	6.45	81	.03	0.00	.03	0.
1.01	6.50	82	.03	0.00	.03	0.
1.01	6.55	83	.03	0.00	.03	0.
1.01	7.00	84	.03	0.00	.03	0.
1.01	7.05	85	.03	0.00	.03	0.
1.01	7.10	86	.03	0.00	.03	0.
1.01	7.15	87	.03	.01	.02	1.
1.01	7.20	88	.03	.02	.01	3.
1.01	7.25	89	.03	.02	.01	7.
1.01	7.30	90	.03	.02	.01	15.
1.01	7.35	91	.03	.02	.01	26.
1.01	7.40	92	.03	.02	.01	41.
1.01	7.45	93	.03	.02	.01	56.
1.01	7.50	94	.03	.02	.01	71.
1.01	7.55	95	.03	.02	.01	85.
1.01	8.00	96	.03	.02	.01	97.
1.01	8.05	97	.03	.02	.01	108.
1.01	8.10	98	.03	.02	.01	115.
1.01	8.15	99	.03	.02	.01	121.
1.01	8.20	100	.03	.02	.01	126.
1.01	8.25	101	.03	.02	.01	130.
1.01	6.30	102	.03	.02	.01	133.
1.01	8.35	103	.03	.02	.01	135.
1.01	8.40	104	.03	.02	.01	137.
1.01	8.45	105	.03	.02	.01	139.
1.01	8.50	106	.03	.02	.01	140.
1.01	8.55	107	.03	.02	.01	141.
1.01	9.00	108	.03	.02	.01	142.
1.01	9.05	109	.03	.02	.01	142.
1.01	9.10	110	.03	.02	.01	143.
1.01	9.15	111	.03	.02	.01	143.
1.01	9.20	112	.03	.02	.01	144.
1.01	9.25	113	.03	.02	.01	144.
1.01	9.30	114	.03	.02	.01	144.
1.01	9.35	115	.03	.02	.01	144.
1.01	9.40	116	.03	.02	.01	144.
1.01	9.45	117	.03	.02	.01	144.
1.01	9.50	118	.03	.02	.01	144.
1.01	9.55	119	.03	.02	.01	144.
1.01	10.00	120	.03	.02	.01	144.
1.01	10.05	121	.03	.02	.01	144.
1.01	10.10	122	.03	.02	.01	144.
1.01	10.15	123	.03	.02	.01	144.
1.01	10.20	124	.03	.02	.01	144.
1.01	10.25	125	.03	.02	.01	144.
1.01	10.30	126	.03	.02	.01	144.
1.01	10.35	127	.03	.02	.01	144.
1.01	10.40	128	.03	.02	.01	144.
1.01	10.45	129	.03	.02	.01	144.
1.01	10.50	130	.03	.02	.01	144.
1.01	10.55	131	.03	.02	.01	144.
1.01	11.00	132	.03	.02	.01	144.
1.01	11.05	133	.03	.02	.01	144.
1.01	11.10	134	.03	.02	.01	144.
1.01	11.15	135	.03	.02	.01	144.
1.01	11.20	136	.03	.02	.01	144.
1.01	11.25	137	.03	.02	.01	144.
1.01	11.30	138	.03	.02	.01	144.
1.01	11.35	139	.03	.02	.01	144.
1.01	11.40	140	.03	.02	.01	144.
1.01	11.45	141	.03	.02	.01	144.
1.01	11.50	142	.03	.02	.01	144.
1.01	11.55	143	.03	.02	.01	144.
1.01	12.00	144	.03	.02	.01	144.

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
1.01	12.05	145	.17	.16	.01	152.
1.01	12.10	146	.17	.16	.01	176.
1.01	12.15	147	.17	.16	.01	223.
1.01	12.20	148	.17	.16	.01	303.
1.01	12.25	149	.17	.16	.01	414.
1.01	12.30	150	.17	.16	.01	541.
0.00	0.00	151	.17	.16	.01	673.
0.00	0.00	152	.17	.16	.01	799.
0.00	0.00	153	.17	.16	.01	914.
0.00	0.00	154	.17	.16	.01	1012.
0.00	0.00	155	.17	.16	.01	1090.
0.00	0.00	156	.17	.16	.01	1149.
0.00	0.00	157	.20	.19	.01	1197.
0.00	0.00	158	.20	.19	.01	1239.
0.00	0.00	159	.20	.19	.01	1280.
0.00	0.00	160	.20	.19	.01	1322.
0.00	0.00	161	.20	.19	.01	1367.
0.00	0.00	162	.20	.19	.01	1411.
0.00	0.00	163	.20	.19	.01	1454.
0.00	0.00	164	.20	.19	.01	1493.
0.00	0.00	165	.20	.19	.01	1527.
0.00	0.00	166	.20	.19	.01	1556.
0.00	0.00	167	.20	.19	.01	1579.
0.00	0.00	168	.20	.19	.01	1596.
0.00	0.00	169	.25	.24	.01	1613.
0.00	0.00	170	.25	.24	.01	1632.
0.00	0.00	171	.25	.24	.01	1658.
0.00	0.00	172	.25	.24	.01	1693.
0.00	0.00	173	.25	.24	.01	1737.
0.00	0.00	174	.25	.24	.01	1787.
0.00	0.00	175	.25	.24	.01	1837.
0.00	0.00	176	.25	.24	.01	1884.
0.00	0.00	177	.25	.24	.01	1927.
0.00	0.00	178	.25	.24	.01	1963.
0.00	0.00	179	.25	.24	.01	1991.
0.00	0.00	180	.25	.24	.01	2013.
0.00	0.00	181	.15	.14	.01	2025.
0.00	0.00	182	.30	.30	.01	2030.
0.00	0.00	183	.30	.30	.01	2034.
0.00	0.00	184	.46	.45	.01	2046.
0.00	0.00	185	.53	.52	.01	2092.
0.00	0.00	186	1.29	1.28	.01	2234.
0.00	0.00	187	2.13	2.12	.01	2557.
0.00	0.00	188	.84	.83	.01	3105.
0.00	0.00	189	.53	.52	.01	3838.
0.00	0.00	190	.46	.45	.01	4685.
0.00	0.00	191	.30	.30	.01	5426.
0.00	0.00	192	.30	.30	.01	5889.
0.00	0.00	193	.23	.23	.01	6050.
0.00	0.00	194	.23	.23	.01	5941.
0.00	0.00	195	.23	.23	.01	5619.
0.00	0.00	196	.23	.23	.01	5152.
0.00	0.00	197	.23	.23	.01	4595.
0.00	0.00	198	.23	.23	.01	4073.
0.00	0.00	199	.23	.23	.01	3649.
0.00	0.00	200	.23	.23	.01	3303.
0.00	0.00	201	.23	.23	.01	3030.
0.00	0.00	202	.23	.23	.01	2806.
0.00	0.00	203	.23	.23	.01	2625.
0.00	0.00	204	.23	.23	.01	2485.
0.00	0.00	205	.18	.18	.01	2372.
0.00	0.00	206	.18	.18	.01	2274.
0.00	0.00	207	.18	.18	.01	2187.
0.00	0.00	208	.18	.18	.01	2104.
0.00	0.00	209	.18	.18	.01	2022.
0.00	0.00	210	.18	.18	.01	1942.
0.00	0.00	211	.18	.18	.01	1868.
0.00	0.00	212	.18	.18	.01	1802.
0.00	0.00	213	.18	.18	.01	1745.
0.00	0.00	214	.18	.18	.01	1697.
0.00	0.00	215	.18	.18	.01	1660.
0.00	0.00	216	.18	.18	.01	1630.
0.00	0.00	217	.01	.00	.01	1596.
0.00	0.00	218	.01	.00	.01	1548.
0.00	0.00	219	.01	.00	.01	1475.

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
0.00	0.00	220	.01	.00	.01	1365.
0.00	0.00	221	.01	.00	.01	1222.
0.00	0.00	222	.01	.00	.01	1062.
0.00	0.00	223	.01	.00	.01	899.
0.00	0.00	224	.01	.00	.01	743.
0.00	0.00	225	.01	.00	.01	603.
0.00	0.00	226	.01	.00	.01	483.
0.00	0.00	227	.01	.00	.01	388.
0.00	0.00	228	.01	.00	.01	316.
0.00	0.00	229	.01	.00	.01	287.
0.00	0.00	230	.01	.00	.01	268.
0.00	0.00	231	.01	.00	.01	250.
0.00	0.00	232	.01	.00	.01	233.
0.00	0.00	233	.01	.00	.01	218.
0.00	0.00	234	.01	.00	.01	203.
0.00	0.00	235	.01	.00	.01	189.
0.00	0.00	236	.01	.00	.01	177.
0.00	0.00	237	.01	.00	.01	165.
0.00	0.00	238	.01	.00	.01	154.
0.00	0.00	239	.01	.00	.01	144.
0.00	0.00	240	.01	.00	.01	134.
0.00	0.00	241	.01	.00	.01	125.
0.00	0.00	242	.01	.00	.01	117.
0.00	0.00	243	.01	.00	.01	109.
0.00	0.00	244	.01	.00	.01	102.
0.00	0.00	245	.01	.00	.01	95.
0.00	0.00	246	.01	.00	.01	88.
0.00	0.00	247	.01	.00	.01	82.
0.00	0.00	248	.01	.00	.01	77.
0.00	0.00	249	.01	.00	.01	72.
0.00	0.00	250	.01	.00	.01	67.
0.00	0.00	251	.01	.00	.01	63.
0.00	0.00	252	.01	.00	.01	58.
0.00	0.00	253	.01	.00	.01	54.
0.00	0.00	254	.01	.00	.01	51.
0.00	0.00	255	.01	.00	.01	47.
0.00	0.00	256	.01	.00	.01	44.
0.00	0.00	257	.01	.00	.01	43.
0.00	0.00	258	.01	.00	.01	43.
0.00	0.00	259	.01	.00	.01	43.
0.00	0.00	260	.01	.00	.01	43.
0.00	0.00	261	.01	.00	.01	43.
0.00	0.00	262	.01	.00	.01	43.
0.00	0.00	263	.01	.00	.01	43.
0.00	0.00	264	.01	.00	.01	43.
0.00	0.00	265	.01	.00	.01	43.
0.00	0.00	266	.01	.00	.01	43.
0.00	0.00	267	.01	.00	.01	43.
0.00	0.00	268	.01	.00	.01	43.
0.00	0.00	269	.01	.00	.01	43.
0.00	0.00	270	.01	.00	.01	43.
0.00	0.00	271	.01	.00	.01	43.
0.00	0.00	272	.01	.00	.01	43.
0.00	0.00	273	.01	.00	.01	43.
0.00	0.00	274	.01	.00	.01	43.
0.00	0.00	275	.01	.00	.01	43.
0.00	0.00	276	.01	.00	.01	43.
0.00	0.00	277	.01	.00	.01	43.
0.00	0.00	278	.01	.00	.01	43.
0.00	0.00	279	.01	.00	.01	43.
0.00	0.00	280	.01	.00	.01	43.
0.00	0.00	281	.01	.00	.01	43.
0.00	0.00	282	.01	.00	.01	43.
0.00	0.00	283	.01	.00	.01	43.
0.00	0.00	284	.01	.00	.01	43.
0.00	0.00	285	.01	.00	.01	43.
0.00	0.00	286	.01	.00	.01	43.
0.00	0.00	287	.01	.00	.01	43.
0.00	0.00	288	.01	.00	.01	43.
		SUM	23.40	20.72	2.68	180713.
			(594.)	(526.)	(68.)	(5117.22)

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	6050.	2270.	628.	628.	180722.
CMS	171.	64.	18.	18.	5117.
INCHES		18.85	20.85	20.85	20.85
MM		478.95	529.52	529.52	529.52
AC-FT		1126.	1245.	1245.	1245.
THOUS CU M		1389.	1535.	1535.	1535.

HYDROGRAPH AT STA LAKE FOR PLAN 1, RTIO 1

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	3025.	1135.	314.	314.	90361.
CMS	86.	32.	9.	9.	2559.
INCHES		9.43	10.42	10.42	10.42
MM		239.47	264.76	264.76	264.76
AC-FT		563.	622.	622.	622.
THOUS CU M		694.	768.	768.	768.

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HYDROGRAPH ROUTING

ROUTE DISCHARGE THROUGH DAM

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
DAM	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP		LSTR
0.0	0.000	0.00	1	1	0	0		0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-294.	-1

STAGE	293.40	293.70	294.50	295.00	296.00	297.00
FLOW	0.00	3.00	77.00	193.00	514.00	870.00

SURFACE AREA=	0.	151.	354.	496.
CAPACITY=	0.	503.	1976.	10436.
ELEVATION=	284.	294.	300.	320.

CREL	SPWID	COQW	EXPW	ELEVL	COQL	CAREA	EXPL
293.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COQD	EXPD	DAMWID
296.0	2.6	1.5	2535.

STATION DAM, PLAN 1, RATIO 1

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

3.	3.	3.	3.	3.	3.	3.	3.	3.	3.
3.	3.	3.	3.	3.	3.	3.	3.	3.	3.
3.	3.	3.	3.	3.	3.	3.	3.	3.	3.
3.	3.	3.	3.	3.	3.	3.	3.	3.	3.
3.	3.	3.	3.	3.	3.	3.	3.	3.	3.
3.	3.	3.	3.	3.	3.	3.	3.	3.	3.
3.	3.	3.	3.	3.	3.	3.	3.	3.	3.
3.	3.	3.	3.	3.	3.	3.	3.	3.	3.
3.	3.	3.	3.	3.	3.	3.	3.	3.	3.
3.	3.	3.	3.	3.	3.	3.	3.	3.	4.
4.	4.	4.	5.	5.	5.	5.	6.	6.	6.
7.	7.	7.	7.	8.	8.	8.	9.	9.	9.
9.	10.	10.	10.	11.	11.	11.	11.	12.	12.
12.	12.	13.	13.	13.	13.	14.	14.	14.	14.
15.	15.	15.	15.	16.	16.	16.	17.	18.	18.
20.	21.	23.	25.	27.	29.	32.	34.	36.	39.
42.	44.	47.	50.	53.	55.	58.	61.	64.	67.
70.	73.	76.	82.	90.	98.	106.	114.	123.	131.
139.	147.	155.	163.	170.	179.	188.	201.	219.	242.
269.	299.	330.	361.	389.	415.	437.	456.	471.	485.
496.	506.	517.	554.	601.	648.	692.	729.	761.	786.
804.	817.	825.	829.	830.	829.	827.	822.	815.	803.
786.	762.	734.	701.	667.	631.	598.	567.	541.	522.
513.	509.	504.	500.	496.	492.	488.	484.	479.	475.
471.	466.	462.	458.	453.	449.	445.	440.	436.	432.
427.	423.	419.	415.	410.	406.	402.	398.	394.	390.
386.	382.	378.	374.	370.	366.	362.	358.	355.	351.
347.	343.	340.	336.	333.	329.	326.	322.	319.	315.
312.	309.	305.	302.	299.	296.	292.	289.		

STORAGE

459.	459.	459.	459.	459.	459.	459.	459.	459.	459.
459.	459.	459.	459.	459.	459.	459.	459.	459.	459.
459.	459.	459.	459.	459.	459.	459.	459.	459.	459.
459.	459.	459.	459.	459.	459.	459.	459.	459.	459.
459.	459.	459.	459.	459.	458.	458.	458.	458.	458.
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458.	458.	458.	458.	458.	458.	458.	458.	458.	458.
458.	458.	458.	458.	458.	459.	459.	459.	460.	460.
461.	461.	461.	462.	462.	463.	463.	464.	464.	465.
465.	465.	466.	466.	467.	467.	468.	468.	468.	469.
469.	470.	470.	471.	471.	471.	472.	472.	473.	473.
474.	474.	474.	475.	475.	476.	476.	476.	477.	477.
478.	478.	478.	479.	479.	480.	480.	481.	482.	484.
486.	488.	491.	494.	497.	501.	505.	509.	513.	517.
521.	526.	530.	535.	540.	545.	550.	555.	560.	565.
570.	575.	581.	586.	592.	597.	603.	609.	615.	621.
627.	633.	639.	645.	651.	657.	654.	672.	683.	696.
711.	729.	747.	766.	783.	799.	813.	824.	835.	843.
851.	857.	863.	868.	872.	876.	879.	881.	883.	885.
886.	886.	887.	887.	887.	887.	887.	887.	886.	886.
885.	883.	881.	879.	877.	874.	872.	869.	866.	864.
861.	858.	856.	853.	850.	848.	845.	842.	839.	837.
834.	831.	829.	826.	823.	820.	818.	815.	812.	809.
807.	804.	801.	799.	796.	793.	791.	788.	786.	783.
781.	778.	776.	774.	771.	769.	766.	764.	762.	760.
757.	755.	753.	751.	749.	747.	745.	742.	740.	738.
736.	734.	733.	731.	729.	727.	725.	723.		

STAGE

293.7	293.7	293.7	293.7	293.7	293.7	293.7	293.7	293.7	293.7
293.7	293.7	293.7	293.7	293.7	293.7	293.7	293.7	293.7	293.7
293.7	293.7	293.7	293.7	293.7	293.7	293.7	293.7	293.7	293.7
293.7	293.7	293.7	293.7	293.7	293.7	293.7	293.7	293.7	293.7
293.7	293.7	293.7	293.7	293.7	293.7	293.7	293.7	293.7	293.7
293.7	293.7	293.7	293.7	293.7	293.7	293.7	293.7	293.7	293.7
293.7	293.7	293.7	293.7	293.7	293.7	293.7	293.7	293.7	293.7
293.7	293.7	293.7	293.7	293.7	293.7	293.7	293.7	293.7	293.7
293.7	293.7	293.7	293.7	293.7	293.7	293.7	293.7	293.7	293.7
293.7	293.7	293.7	293.7	293.7	293.7	293.7	293.7	293.7	293.7
293.7	293.7	293.7	293.7	293.7	293.7	293.7	293.7	293.7	293.7
293.7	293.7	293.7	293.7	293.8	293.8	293.8	293.8	293.8	293.8
293.8	293.8	293.8	293.8	293.8	293.8	293.8	293.8	293.8	293.8
293.8	293.8	293.8	293.8	293.8	293.8	293.8	293.8	293.8	293.8
293.8	293.8	293.8	293.8	293.8	293.8	293.8	293.8	293.9	293.9
293.9	293.9	293.9	293.9	294.0	294.0	294.0	294.0	294.1	294.1
294.1	294.1	294.2	294.2	294.2	294.3	294.3	294.3	294.4	294.4
294.4	294.5	294.5	294.5	294.6	294.6	294.6	294.7	294.7	294.7
294.8	294.8	294.8	294.9	294.9	294.9	295.0	295.0	295.1	295.2
295.2	295.3	295.4	295.5	295.6	295.7	295.8	295.8	295.9	295.9
295.9	296.0	296.0	296.0	296.0	296.1	296.1	296.1	296.1	296.1
296.1	296.1	296.1	296.1	296.1	296.1	296.1	296.1	296.1	296.1
296.1	296.1	296.1	296.1	296.1	296.1	296.0	296.0	296.0	296.0
296.0	296.0	296.0	296.0	295.9	295.9	295.9	295.9	295.9	295.9
295.9	295.9	295.8	295.8	295.8	295.8	295.8	295.8	295.8	295.7
295.7	295.7	295.7	295.7	295.7	295.7	295.7	295.6	295.6	295.6
295.6	295.6	295.6	295.6	295.6	295.5	295.5	295.5	295.5	295.5
295.5	295.5	295.5	295.4	295.4	295.4	295.4	295.4	295.4	295.4
295.4	295.4	295.3	295.3	295.3	295.3	295.3	295.3		

PEAK OUTFLOW IS 830. AT TIME 17.92 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	830.	548.	181.	181.	52114.
CMS	24.	16.	5.	5.	1476.
INCHES		4.55	6.01	6.01	6.01
MM		115.56	152.70	152.70	152.70
AC-FT		272.	359.	359.	359.
THOUS CU M		335.	443.	443.	443.

SUMMARY OF DAM SAFETY ANALYSIS

.....		INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
	ELEVATION	293.70	293.40	296.00
	STORAGE	459.	418.	862.
	OUTFLOW	3.	0.	514.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.50	296.12	.12	887.	830.	2.33	17.92	0.00
.40	295.81	0.00	824.	454.	0.00	18.50	0.00
.30	295.39	0.00	740.	317.	0.00	18.50	0.00
.20	294.91	0.00	653.	173.	0.00	18.58	0.00
.10	294.35	0.00	558.	63.	0.00	18.75	0.00

APPENDIX 5

Bibliography

AD-A074 271 NEW JERSEY DEPT OF ENVIRONMENTAL PROTECTION TRENTON F/G 13/2
NATIONAL DAM SAFETY PROGRAM. LAKE PARSIPPANY DAM (NJ-00355), PA--ETC(U)
MAY 79 R J MCDERMOTT, J E GRIBBIN DACW61-79-C-0011

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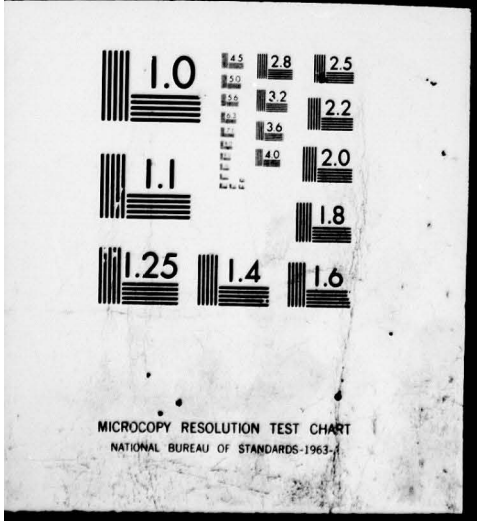

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